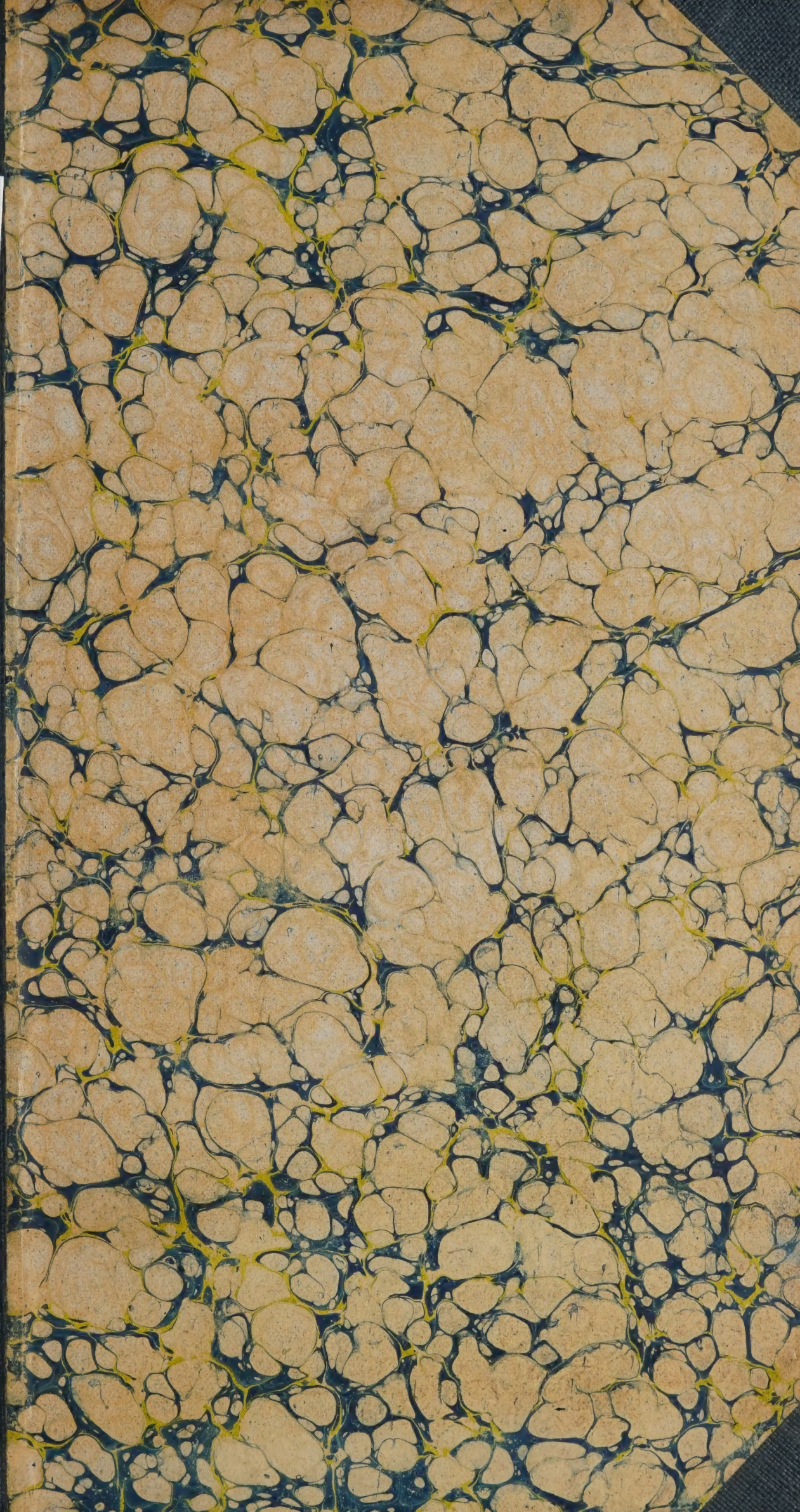




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Canada, Agriculture, Department of.
Experimental Farms

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	-	-	-	-	-	-	WM. SAUNDERS
AGRICULTURIST	-	-	-	-	-	-	JAS. W. ROBERTSON
HORTICULTURIST	-	-	-	-	-	-	JOHN CRAIG
CHEMIST	-	-	-	-	-	-	F. T. SHUTT, M.A.
ENTOMOLOGIST and BOTANIST	-	-	-	-	-	-	JAS. FLETCHER
POULTRY MANAGER	-	-	-	-	-	-	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, Nappan, N.S.	-	-	-	-	-	-	WM. M. BLAIR
"							Brandon, Manitoba - S. A. BEDFORD
"							Indian-Head, N.W.T. - ANGUS MACKAY
"							Agassiz, B.C. - THOS. A. SHARPE

FOR

1894-1895

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PRINTED BY ORDER OF PARLIAMENT



OTTAWA

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1895

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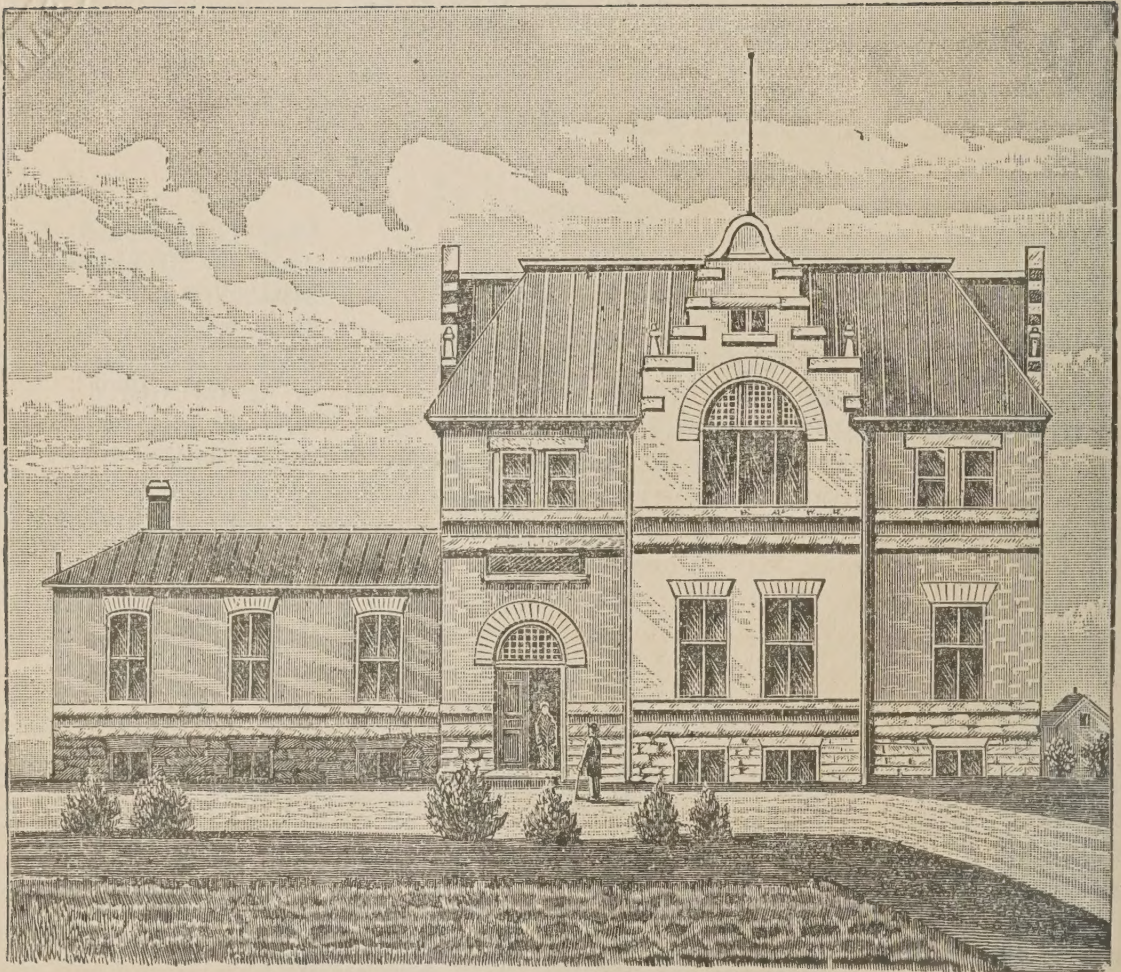


Figure 1.—Office Building, Museum and Chemical Laboratory
of the Central Experimental Farm.

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS.

—:O:—

OTTAWA, 30th November, 1894.

SIR,—I have the honour to submit for your approval my eighth annual report of the work done and in progress at the several experimental farms established in different parts of the Dominion.

You will also find appended reports from the following officers of the Central Experimental Farm: From the Agriculturist, Mr. James W. Robertson; from the Horticulturist, Mr. John Craig; from the Chemist, Mr. Frank T. Shutt; and from the Entomologist and Botanist, Mr. James Fletcher. A report is also submitted from the Poultry Manager, Mr. A. G. Gilbert.

From the branch experimental farms there are reports from Mr. Wm. M. Blair, superintendent of the experimental farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, superintendent of the experimental farm for Manitoba, at Brandon; from Mr. Angus McKay, superintendent of the experimental farm for the North-west Territories, at Indian Head; and from Mr. Thos. A. Sharpe, superintendent of the experimental farm for British Columbia, at Agassiz.

These reports contain particulars of the results of the experimental work which has been conducted in agriculture, horticulture and arboriculture embodying the outcome of much practical work in the fields, orchards, barns, dairy and poultry buildings; also of scientific investigation of chemical problems in the laboratory and the careful study of the life history and habits of noxious insects and plants, with suggestions of measures calculated to lessen the injury they cause. Also details of the experiments which have been carried on during the past year in bee-keeping.

The increasing demand among farmers for these reports is a gratifying indication of the desire for information among this class of the community and of the high esteem in which these records of the work of the experimental farms are held. It is hoped that the facts brought together in the present issue will be found quite as valuable to the agricultural community as those contained in any of the preceding reports.

I have the honour to be, sir,
Your obedient servant,

WM. SAUNDERS,
Director.

The Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS.

REPORT OF THE DIRECTOR.

(*WM. SAUNDERS, F.R.S.C., F.L.S. F.C.S.*)

The results of eight years of experimental work covering nearly all the departments in which the farming class of the community is engaged, together with the testing of fruits, vegetables, poultry, economic and ornamental trees, shrubs, plants and flowers, are shown in the accumulation of a mass of facts relating to these several subjects, the recital of which gives increasing value to the annual reports of the experimental farms. Where conclusions are drawn from the results of the tests of a single year, they are frequently found to be unreliable as a guide, and since no two seasons are alike, they can scarcely be repeated with similar returns ; but where such tests have been carried on through a series of years the average results may be taken as fairly trustworthy.

The very low prices which continue to prevail for wheat and the coarse grains, the returns from the sale of which give now but a small margin beyond the cost of growing, has obliged many farmers to turn their attention to more profitable methods of disposing of these crops than by their bulk sale in the markets.

The census for 1890 shows that the number of persons engaged in agricultural pursuits in the Dominion of Canada—farmers and farmers' sons—was in that year 649,506. These with the families depending on them will, it is estimated, make up 45 per cent of the entire population of the country. Where so large a proportion of the community depend for their livelihood on the cultivation of the soil, it is of the utmost importance for the welfare and prosperity of the entire country that their efforts should be directed into the most profitable channels. The experiments which have been conducted at the Central and branch Experimental Farms have demonstrated that wheat, as well as other grain, may be made a greater source of profit if fed to steers and swine and thus converted into beef and pork, than by selling these crops in their crude state, at present prices. The feeding of these grains mixed with suitable succulent food, such as ensilage, to cows and converting their milk into cheese and butter, has also been shown to be more profitable than the sale of such grain. Hence the dairying industry has grown very rapidly in Canada of late years, and the demand for first class dairy products seems to be almost unlimited. This branch of farm work has also this great advantage, that the elements of fertility which have been taken from the land by the grain during the process of its growth, is, to a very large extent, restored to the soil in the barnyard manure. It has also the further advantage, when butter-making is carried on during the winter months, of giving additional employment to the farm hands during that season. The more general feeding of a proportion of wheat to swine and cattle will also consume some part of the large stock which has been grown in excess of the requirements of mankind, and which has, no doubt, had the effect of bringing down the price to the present unusually low and unremunerative figure.

DISTRIBUTION OF SEED GRAIN.

The work carried on with grain, at the Experimental Farms, has not been limited to the testing of varieties and determining which sorts promise to be the more profitable for general growth, but during the past six years the endeavour has been made to improve the character and quality of the various sorts of grain grown in Canada, by the distribution of samples among farmers, for seed, of those sorts which have given the best returns. The good results of this continued effort are now beginning to appear in many districts, where these newer and more productive sorts of grain are fast replacing some of the less prolific varieties formerly in cultivation. At the outset, when the applications for samples were fewer, there was no difficulty in sending two or three samples to each applicant; but the number of requests received has increased so largely that it was found necessary, last year, to reduce the number of samples sent to each individual to two, and later in the season, to one. With this limitation the available stock was all promised by the middle of February, when the lists had to be closed and the many later applicants could not be supplied. As it is very desirable that this distribution be as general as possible, it is proposed to limit the number of samples during the coming season to one for each individual.

The distribution provided for from the Central Experimental Farm, for 1895, will consist chiefly of the most promising varieties of oats, barley, wheat, pease and potatoes, all of which have been grown on the Experimental Farms for this purpose. The several branch farms will also distribute, as heretofore, samples to the farmers residing in the provinces and territories where these institutions are established.

The samples sent out from the Experimental Farm at Ottawa during the early months of 1894, were distributed as follows :

Prince Edward Island.

Oats.....	122
Wheat.....	77
Barley.....	73
Pease.....	50
Potatoes.....	6
Corn.....	4
	<hr/>
	332
	<hr/>

Number of applicants supplied, 173.

Nova Scotia.

Oats.....	468
Barley.....	376
Wheat.....	328
Pease.....	159
Potatoes.....	40
Corn.....	26
	<hr/>
	1,397
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Number of applicants supplied, 758.

New Brunswick.

Oats.....	344
Barley.....	237
Wheat.....	232
Pease.....	72
Potatoes.....	31
Corn.....	44
	<hr/>
	960
	<hr/>

Number of applicants supplied, 581.

Ontario.

Oats.....	763
Barley.....	599
Wheat.....	648
Pease.....	225
Potatoes.....	140
Corn.....	125
Horse beans	5
	<hr/>
	2,505
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Number of applicants supplied, 1,590.

Quebec.

Oats.....	4,366
Barley.....	3,894
Wheat.....	2,567
Pease.....	1,750
Potatoes.....	1,006
Corn.....	760
Horse beans.....	6
	<hr/>
	14,349
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Number of applicants supplied, 9,740.

Manitoba.

Oats.....	288
Barley.....	191
Wheat.....	150
Pease.....	81
Potatoes.....	12
Corn.....	4
	<hr/>
	726
	<hr/>

Number of applicants supplied, 382.

North-west Territories.

Oats.....	163
Barley.....	130
Wheat.....	108
Pease.....	41
Potatoes.....	17
Corn.....	2
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	461
	<hr/>

Number of applicants supplied, 252.

British Columbia.

Oats.....	56
Barley.....	30
Wheat.....	35
Pease.....	22
Potatoes.....	1
Corn.....	2
Horse beans.....	1
	<hr/>
	147
	<hr/>

Number of applicants supplied 75.

The following list shows the number of three-pound packages of the different varieties which have been distributed :—

Oats

Prize Cluster.....	2,690
Banner.....	1,327
White Poland.....	1,255
Bonanza.....	611
Wallis.....	508
Bavarian.....	92
Golden Giant.....	87
	<hr/>
	6,570
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Barley—Two-rowed.

Canadian Thorpe.....	3,658
Duck-bill.....	1,348
Goldthorpe.....	73
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	5,079
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Barley—Six-rowed.

Rennie's Improved.....	305
Baxter's Six-rowed.....	146
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	451
	<hr/>

Wheat.

Red Fife.....	2,056
Campbell's White Chaff.....	898
White Connell.....	418
Wellman's Fife.....	414
White Fife.....	332
Ladoga.....	27
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	4,145
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Pease.

Mummy.....	1,524
Large white Marrowfat.....	876
	<hr/>
	2,400
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Potatoes.

Lee's Favourite.....	374
Wonder of the World.....	289
Early Puritan.....	216
Thorburn.....	194
Beauty of Hebron.....	178
Red Dakota.....	1
Everett.....	1
	<hr/>
	1,253
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Corn.

Pearce's Prolific.....	504
Longfellow.....	424
Compton's Early.....	39
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	967
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Horse Beans.....	12
	<hr/>

A few samples of Fall Wheat were also sent out, including the following to

Ontario	12
Quebec.....	6
British Columbia.....	23
	<hr/>
	41
	<hr/>

Number of applicants supplied, 35.

Total number of samples distributed at the Central Experimental Farm...	20,918
Total number of applicants supplied.....	13,586
	<hr/>

Samples were also distributed at the branch Experimental Farms as follows :

Experimental Farm, Nappan, N. S.

Oats.....	290
Barley.....	118
Wheat.....	138
Pease.....	31
Potatoes.....	203
	<hr/>
	780
	<hr/>

Number of applicants supplied, 338.

Experimental Farm, Brandon, Man.

Oats.....	43
Barley.....	18
Wheat.....	25
Potatoes.....	71
	<hr/>
	157
	<hr/>

Number of applicants supplied, 157.

Experimental Farm, Indian Head, N. W. T.

Oats.....	296
Barley.....	154
Wheat.....	176
Spring Rye.....	18
Pease.....	73
Potatoes.....	286
	<hr/>
	1,003
	<hr/>

Number of applicants supplied, 379.

Experimental Farm, Agassiz, B.C.

Oats.....	117
Barley.....	89
Fall Wheat.....	31
Spring Wheat.....	83
Pease.....	95
Potatoes.....	141
	<hr/>
	556
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Number of applicants supplied, 482.

Making a total of 2,496 samples supplied to 1,356 applicants by the branch Experimental Farms. This, added to the distribution made at the Central Farm, gives a total of 23,414 samples to 14,942 applicants.

The branch Experimental Farms also supplied a large number of farmers in their several districts, with new and promising sorts of grain in bags of two bushels each. These were sold to farmers at a slight advance on the ordinary prices prevailing at the time, for such grain.

EXPERIMENTS WITH OATS.

Comparative tests have been made with 36 varieties of oats, for earliness, yield and other qualities. These were all sown on clay loam and about the same time, on plots of $\frac{1}{20}$ of an acre each, excepting the varieties known as Banner and Abundance, which were on plots of $\frac{1}{40}$ of an acre. The previous crop was Indian Corn, and the land was manured in the spring of 1891 with about 20 tons of barnyard manure to the acre; it also received an application of wood ashes late in the autumn of 1893, about 150 bushels to the acre. The treatment of the land was as follows: It was gang-ploughed very shallow in the autumn of 1893, after harvesting, to cover and start into growth any shed grain or weed seeds lying on the surface. Later in the autumn, it was ploughed seven to eight inches deep, and it was disc-harrowed and harrowed with the smoothing harrow in the spring, before sowing. All the varieties were sown on April 18th and 19th.

OATS, Test of Varieties.

Name of Variety.	Date of ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
			Inches.		Inches.		bus. lbs.	Lbs.	
Early Blossom.....	July 31	103	42 to 51	Stiff..	7 to 9	Sided....	43 8	35 $\frac{1}{2}$	Considerably.
Abyssinia.....	" 30	103	42 to 54	" ..	7 to 9	Half sided	42 12	38 $\frac{1}{4}$	"
Banner.....	" 28	100	38 to 48	" ..	7 to 9	Branching	39 14	34 $\frac{1}{2}$	Slightly.
Lincoln.....	" 28	100	40 to 48	" ..	7 to 9	"	39 4	33 $\frac{3}{4}$	"
Golden Beauty.....	" 29	101	39 to 45	" ..	7 to 9	"	39 4	33 $\frac{3}{4}$	"
Early Gothland.....	" 29	100	42 to 54	" ..	8 to 10	Half sided	39 4	40 $\frac{1}{4}$	Slightly.
Oderbruch.....	" 30	102	42 to 58	" ..	7 to 9	"	38 28	38 $\frac{3}{4}$	Considerably.
Joanette.....	Aug. 1	104	39 to 48	Fair..	7 to 9	Branching	37 32	33	Slightly.
Rosedale.....	July 30	103	42 to 54	Stiff..	8 to 9 $\frac{1}{2}$	Half sided	37 18	38 $\frac{1}{2}$	Slightly.
Giant Cluster.....	Aug. 7	110	36 to 50	" ..	8 to 10	Sided.....	37 2	31	Considerably.
Californian Prolific Black...	" 1	104	32 to 46	Fair..	6 to 8	"	36 27	29	Considerably.
Poland.....	July 28	100	45 to 51	Stiff..	8 to 10	Branching	36 26	37 $\frac{1}{4}$	Slightly.
Early Etampes, not distin- guishable from Joanette...	Aug. 1	104	36 to 42	Fair..	7 to 9	"	35 10	32	Slightly.
Early Archangel.....	July 28	101	44 to 51	" ..	8 to 10	"	34 25	40 $\frac{1}{2}$	Very slightly.
American Triumph.....	" 31	103	36 to 43	Stiff..	6 to 8	"	34 24	32 $\frac{1}{4}$	Slightly.
Golden Giant, same as Giant Cluster.....	Aug. 7	110	36 to 46	" ..	9 to 11	Sided.....	34 14	29 $\frac{3}{4}$	Considerably.
Wide-Awake.....	July 30	102	36 to 48	Fair..	7 to 9	Branching	32 32	31	"
Wallis.....	" 29	101	36 to 48	Stiff..	7 to 9	"	32 12	33 $\frac{1}{2}$	Slightly.
Columbus.....	" 29	101	42 to 50	Fair..	7 to 9	"	32 12	33	"
Imported Irish.....	" 25	96	42 to 51	Fair..	8 to 11	"	32 12	39 $\frac{1}{2}$	"
Improved Ligowo.....	" 28	100	39 to 46	Stiff..	7 to 9	"	31 26	36	Very slightly.
Holstein Prolific.....	" 30	102	40 to 46	" ..	7 to 8 $\frac{1}{2}$	"	31 16	34	Slightly.
Abundance.....	" 28	100	33 to 48	" ..	7 to 9	"	31 6	34	Very slightly.
Flying Scotchman.....	" 27	99	36 to 48	Fair..	8 $\frac{1}{2}$ to 11	"	30 30	39	Slightly.
Bavarian.....	" 30	102	40 to 48	Stiff..	7 to 10	"	30 20	33 $\frac{1}{4}$	"
Bonanza.....	" 23	95	36 to 48	Fair..	9 to 11	"	30 20	40	Slightly.
Welcome.....	" 25	98	36 to 54	" ..	8 to 12	"	30 10	39	"
Scottish Chief.....	" 23	95	34 to 43	" ..	9 to 11 $\frac{1}{2}$	"	30 10	37 $\frac{1}{2}$	Considerably.
Coulommiers.....	Aug. 7	110	40 to 48	Fair..	8 to 10	"	30 00	31 $\frac{1}{2}$	"
Rennie's Prize White.....	July 26	98	42 to 55	Fair..	9 to 12	"	29 24	35	"
Prolific Black Tartarian...	Aug. 5	108	43 to 50	Fair..	7 to 8	Sided.....	29 14	30 $\frac{1}{2}$	Badly.
Siberian.....	" 7	110	48 to 56	Stiff..	9 to 10	"	29 4	30	Considerably.
Prize Cluster.....	July 25	98	43 to 54	Fair..	9 to 12	Branching	28 8	39 $\frac{3}{4}$	Slightly.
White Wonder.....	" 23	95	36 to 48	" ..	9 to 11 $\frac{1}{2}$	"	26 26	38 $\frac{3}{4}$	"
White Monarch.....	Aug. 3	106	36 to 48	Fair..	7 to 9	"	26 16	35 $\frac{3}{4}$	Considerably.
Royal Doncaster Prize.....	" 7	110	32 to 42	Weak	7 to 9	"	16 16	32	Badly.

Several of those included in this table are new varieties :

Wallis.—This originated with Mr. John Wallis, of Ferguson, Ont., and is said to have occurred as a sport in a field of Banner. It is a promising oat, a vigorous grower and prolific, stiff in straw—but no stiffer than Improved Ligowo, Abundance or Banner. It resembles Banner when growing.

Bavarian.—This is a promising sort; has been among the best as to yield, during the past season; straw stiff.

Imported Irish.—This is an oat which was imported from Ireland; it is a branching sort; a vigorous grower; fairly stiff in the straw; and has yielded well.

Lincoln.—A promising variety with a branching head; has given a good yield; has a stiff straw, somewhat resembling Banner.

White Monarch.—A branching variety not particularly promising; with fairly stiff straw, not so stiff as that of some of the other leading varieties; this has not yielded so well as most of the other sorts tested.

Columbus.—This variety was imported from Germany in the spring of 1893, but was not reported on last year, owing to the unfavourable conditions which prevailed, the crop of all varieties of oats having been almost destroyed by rust. This variety has done well during the past season; is a vigorous grower, with fairly stiff straw, and seems to be worthy of more extended trial in the eastern provinces; at the western farms it has not succeeded so well.

FIELD CROPS OF OATS.

Prize Cluster.—Soil heavy clay loam; previous crop was barley. Manured with about 18 tons per acre of barnyard manure in the autumn of 1893, when it was ploughed under. The land was disc-harrowed in the spring of 1894 and harrowed with smoothing harrow before seeding; $3\frac{3}{4}$ acres; sown April 24th; $1\frac{1}{2}$ bushels per acre; ripe July 23rd; time to mature, 90 days; yield per acre, 32 bushels 33 lbs.; weight per bushel, $33\frac{3}{4}$ lbs.; length of head, 9 to 11 inches; branching; length of straw, 44 to 48 inches; all standing well; a strong, even growth; leaves and stems considerably rusted.

Another field was sown with this variety, comprising 18 acres of sandy loam of rather poor quality. This was manured in the spring of 1894 with about 18 tons of barnyard manure per acre. The manure was ploughed under, and the land disc-harrowed and harrowed with smoothing harrow, before sowing. Sown May 2nd; $1\frac{3}{4}$ bushels per acre; ripe July 28th; time to mature, 87 days; yield per acre, 18 bushels 7 lbs.; weight per bushel, $33\frac{3}{4}$ lbs.; length of head, 7 to 9 inches; branching; length of straw, 36 to 46 inches: straw standing well; leaves and stems considerably rusted.

Poland White.—On soil partly heavy clay loam and part peaty; previous crop was experimental plots of barley and oats; manured in the autumn of 1893 with about 18 tons of barnyard manure per acre, when it was ploughed under. The land was disc-harrowed in the spring of 1894 and harrowed with smoothing harrow before seeding; $2\frac{1}{2}$ acres; sown April 24th; $1\frac{3}{4}$ bushels per acre; ripe July 24th; time to mature, 91 days; yield per acre, 35 bushels 9 lbs.; weight per bushel, $38\frac{1}{2}$ lbs.; length of head, 9 to 11 inches; branching; length of straw, 42 to 45 inches; all standing well; made a strong, even growth; leaves and stems considerably rusted.

Banner.—On soil part peaty, part clay loam and part sandy loam; previous crop was a mixed grain crop grown for fodder; manured in the spring of 1892 with about 18 tons of barnyard manure per acre. This land was ploughed in the autumn of 1893; disc-harrowed and harrowed with smoothing harrow before seeding, in spring of 1894; $7\frac{3}{4}$ acres; sown April 25th; $2\frac{1}{4}$ bushels per acre; ripe July 30th; time to mature, 96 days; yield per acre, 29 bushels 24 lbs.; weight per bushel, $32\frac{3}{4}$ lbs.; length of head, 7 to 9 inches; branching; length of straw, 36 to 42 inches; all standing well; growth uneven on account of variation in soil; no rust observed.

Golden Giant.—Soil about half clay loam and half sandy loam ; previous crop was mixed grain grown for fodder ; manured in spring of 1892 with about 18 tons of barnyard manure per acre. The land was ploughed in the autumn of 1893 ; disc-harrowed and harrowed with smoothing harrow before seeding, in 1894 ; 3 acres ; sown April 25th ; $2\frac{3}{4}$ bushels per acre ; ripe August 9th : time to mature, 106 days ; weight per bushel, $31\frac{1}{2}$ lbs. ; length of head, 9 to 11 inches ; sided ; length of straw, 36 to 48 inches ; straw stiff and all standing well ; made a strong, even growth ; leaves and stems considerably rusted.

Wallis.—Soil, sandy loam ; previous crop was pease ; manured in the spring of 1893 with about 18 tons of barnyard manure per acre ; ploughed in the autumn of 1893 ; disc-harrowed and harrowed with smoothing harrow before seeding, in spring of 1894 ; four acres ; sown April 25th ; 2 bushels per acre ; ripe August 3rd ; time to mature, 100 days ; yield per acre, 36 bushels 17 lbs. ; weight per bushel 34 lbs. ; length of head, 7 to 10 inches ; branching ; length of straw, 36 to 44 inches ; straw stiff and stood up well ; growth strong and even ; leaves and stems considerably rusted.

Bavarian.—Soil, sandy loam : previous crop was pease ; manured in the spring of 1893 with about 18 tons of barnyard manure per acre ; ploughed in the autumn of 1893 ; disc-harrowed and harrowed with smoothing harrow before seeding in spring of 1894 ; $2\frac{3}{4}$ acres ; sown April 25th ; 2 bushels per acre ; ripe August 3rd ; time to mature, 100 days ; yield per acre, 37 bushels 30 lbs. ; weight per bushel, $34\frac{1}{2}$ lbs. ; length of head, 7 to 10 inches ; branching ; length of straw, 36 to 42 inches ; straw stiff and stood up well ; growth strong and even ; leaves and stems considerably rusted.

Bonanza.—Soil, light sandy loam, most of it of poor quality, with a "hard pan" subsoil ; previous crop was oats ; manured in autumn of 1891, with about 18 tons of barnyard manure per acre ; ploughed in the autumn of 1893 ; disc-harrowed and harrowed with smoothing harrow before seeding, in spring of 1894 ; $1\frac{3}{4}$ acres ; sown April 27th ; $1\frac{1}{2}$ bushels per acre ; ripe July 25th ; time to mature, 89 days ; yield per acre, 19 bushels 4 lbs. ; weight per bushel, $32\frac{1}{4}$ lbs. ; length of head, 7 to 9 inches ; branching ; length of straw, 24 to 42 inches ; straw rather weak and growth uneven ; leaves and stems considerably rusted.

Welcome.—Soil, light sandy loam, with a "hard pan" subsoil, most of it of poor quality ; previous crop was oats ; manured in the autumn of 1891, with about 18 tons of barnyard manure per acre ; ploughed in the autumn of 1893 ; disc-harrowed and harrowed with smoothing harrow before seeding, in spring of 1894 ; 3 acres ; sown April 27th ; $1\frac{1}{2}$ bushels per acre ; ripe July 27th ; time to mature 91 days ; yield per acre, 16 bushels 13 lbs. ; weight per bushel, $37\frac{1}{2}$ lbs. ; length of head, 7 to 9 inches ; branching ; length of straw, 24 to 26 inches ; straw rather weak and growth very uneven on account of variations in soil. This land was flat and the crop suffered from water lying in spots owing to excessive rains.

Early Blossom.—Soil, part peaty and part sandy loam of poor quality ; previous crop was mixed grain grown for fodder ; manured in the spring of 1893 ; with about 18 tons of barnyard manure per acre ; ploughed in the autumn of 1893 ; disc-harrowed and harrowed with smoothing harrow before seeding, in spring of 1894 ; 1 acre ; sown April 27th ; $1\frac{3}{4}$ bushels per acre ; ripe August 1st ; time to mature, 96 days ; yield per acre, 24 bushels 24 lbs. ; weight per bushel, 35 lbs. ; length of head, 6 to 10 inches ; sided ; length of straw, 30 to 42 inches ; straw stiff and stood up well ; leaves and stems considerably rusted.

Abundance.—Soil, part peaty and part sandy loam of poor quality ; previous crop was mixed grain grown for fodder ; manured in spring of 1891 with 18 to 20 tons of barnyard manure per acre ; ploughed in the autumn of 1893 ; disc-harrowed and harrowed with smoothing harrow before seeding, in spring of 1894 ; $1\frac{1}{2}$ acres ; sown April 27th ; $2\frac{1}{4}$ bushels per acre ; ripe July 30th ; time to mature, 94 days ; yield per acre, 36 bushels 1 lb. ; weight per bushel, $30\frac{1}{4}$ lbs. ; length of head, 8 to 10 inches ; branching ; length of straw, 36 to 44 inches ; straw stiff and stood up well, but on account of variability of soil the growth was uneven ; leaves and stems considerably rusted.

EXPERIMENTS WITH BARLEY.

Twenty-nine varieties of barley have been tested during the past season, fourteen of which were two-rowed sorts, and fifteen six-rowed. These were all sown on plots of $\frac{1}{20}$ acre each. The soil was a clay loam of fair quality ; it was manured in the spring of 1891 with about 20 tons of barnyard manure to the acre ; it also received an application of wood ashes late in the autumn of 1893, about 150 bushels to the acre. The land was gang-ploughed very shallow after harvest, in the autumn of 1893, to cover and start into growth any shed grain or weed seeds lying on the surface ; later in the autumn it was again ploughed seven to eight inches deep, and it was disc-harrowed and harrowed with the smoothing harrow in the spring, before sowing. The two-rowed varieties were all sown on April 21st and 22nd, and the six-rowed sorts April 20th and 21st.

TWO-ROWED BARLEY—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield Per Acre.		Weight per Bushel.	Proportion Rusted.
			Inches.		Inches.	Bush.	Lbs.	Lbs.	
Bolton.....	July 18..	89	42 to 48	Fair....	3 to $3\frac{3}{4}$	30	40	$47\frac{3}{4}$	None.
Danish Chevalier... .	" 23..	93	27 to 34	Fair....	3 to $3\frac{3}{4}$	29	18	$48\frac{1}{2}$	Slightly.
California Prolific.....	" 22..	92	34 to 43	Stiff....	$2\frac{3}{4}$ to 3	27	4	50	"
Newton.....	" 22..	92	30 to 40	"	$2\frac{3}{4}$ to 3	27	4	49	"
Improved Chevalier.....	" 23..	92	34 to 38	Fair....	$2\frac{3}{4}$ to $4\frac{1}{2}$	26	32	48	"
French Chevalier.....	" 26 .	96	30 to 39	"	3 to 4	26	22	50	"
Prize Prolific.....	" 21..	91	35 to 38	"	$3\frac{1}{2}$ to $3\frac{3}{4}$	25	40	$48\frac{1}{2}$	"
Duck-bill.....	" 22..	92	36 to 40	Stiff....	$2\frac{3}{4}$ to 3	25	40	49	"
Thanet.....	" 20..	90	34 to 38	Fair....	$3\frac{1}{2}$ to 4	25	30	$48\frac{1}{4}$	"
Kinver Chevalier.....	" 26..	96	33 to 37	"	3 to 4	24	28	50	"
Canadian Thorpe.....	" 23..	93	28 to 43	Stiff....	$2\frac{3}{4}$ to 3	23	16	49	"
Victor.....	" 22..	92	36 to 44	Fair....	$2\frac{3}{4}$ to $3\frac{1}{2}$	23	6	$50\frac{1}{2}$	"
Sidney.....	" 24..	93	36 to 45	"	3 to 4	21	42	50	"
New Golden Grains.....	" 23..	92	21 to 36	"	$3\frac{1}{2}$ to $4\frac{1}{4}$	20	10	48	"

SIX-ROWED BARLEY—TEST OF VARIETIES.

Mensury.....	July 18..	89	43 to 52	Fair....	$2\frac{3}{4}$ to $3\frac{1}{2}$	44	18	$46\frac{1}{4}$	None.
Four-rowed.....	" 19..	90	40 to 50	"	$2\frac{3}{4}$ to $3\frac{3}{4}$	43	46	$46\frac{1}{4}$	"
Odessa.....	" 18..	89	39 to 46	Stiff....	$2\frac{3}{4}$ to $3\frac{1}{4}$	41	32	$46\frac{1}{4}$	"
Common.....	" 15..	86	44 to 48	"	$2\frac{3}{4}$ to 3	37	24	47	"
Royal.....	" 16..	87	39 to 44	Fair....	$2\frac{3}{4}$ to $3\frac{1}{4}$	36	2	$47\frac{1}{4}$	"
Vanguard.....	" 15..	86	36 to 45	"	$2\frac{3}{4}$ to 3	34	38	$46\frac{3}{4}$	"
Phoenix.....	" 18..	89	36 to 45	Stiff....	$2\frac{1}{4}$ to $2\frac{3}{4}$	33	26	$48\frac{1}{2}$	"
Pioneer.....	" 17..	87	40 to 48	"	$2\frac{1}{4}$ to $2\frac{3}{4}$	33	26	49	"
Oderbruch.....	" 15..	86	36 to 44	"	$2\frac{3}{4}$ to 3	31	2	$48\frac{3}{4}$	"
Stella.....	" 22..	93	36 to 40	"	$2\frac{1}{4}$ to 3	31	2	$48\frac{1}{2}$	Slightly.
Trooper.....	" 18..	89	32 to 40	"	$2\frac{1}{4}$ to 3	30	40	47	None.
Petschora.....	" 15..	86	39 to 44	"	$2\frac{3}{4}$ to 3	30	20	$45\frac{3}{4}$	"
Baxter's.....	" 16..	87	38 to 46	Stiff....	$2\frac{1}{4}$ to $2\frac{3}{4}$	25	40	49	"
Rennie's Improved.....	" 16..	87	36 to 44	"	$2\frac{1}{4}$ to $2\frac{3}{4}$	23	16	$48\frac{3}{4}$	"
Nugent.....	" 20..	90	30 to 37	"	$2\frac{1}{2}$ to 3	22	34	$46\frac{1}{2}$	"

FIELD CROPS OF BARLEY.

Only one variety of barley was sown in field crop. This was Canadian Thorpe, a two-rowed sort. It was sown on clay loam ; previous crop was corn and beans. The land was manured in the spring of 1893,—before sowing the corn and beans,—with from 18 to 20 tons of barnyard manure per acre. It was ploughed in the spring of

1894, and harrowed with smoothing harrow before sowing. 8½ acres, sown April 21st ; 2 bushels per acre ; ripe July 22nd ; time to mature, 92 days ; yield per acre, 25 bushels 13 lbs. : weight per bushel 49¼ lbs. ; length of head, 3 to 3¼ inches ; length of straw, 36 to 42 inches ; all standing well ; some rust on leaves, very little on stems ; no smut.

EXPERIMENTS WITH FALL WHEAT.

Fourteen varieties of fall wheat have been under test during the past season, most of them in plots of ½ acre each. They were all sown on September 13th, 1893, and harvested from the 15th to the 18th of July, 1894. The soil was a sandy loam which had a light coating of manure in the spring of 1893, about 10 tons to the acre. The previous crop was oats. After the oats were harvested the land was gang-ploughed lightly to start weeds and shed grain and ploughed again about 7 inches deep, and harrowed with smoothing harrow before sowing.

The Manchester, Early Red Clawson and Willit's were all injured by depredations of birds ; but for this, the crop of these varieties would have been reported larger.

FALL WHEAT—TEST OF VARIETIES.

Name of Variety.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
	Inches.		Inches.		Bus. lbs.	Lbs.	
Johnson	48 to 56	Stiff	2¼ to 2¾	Bearded ..	42 ..	58½	Slightly to considerably.
Surprise	48 to 56	"	2½ to 3	Beardless.	39 9	59	Very slightly.
Jones' Winter Fife.	48 to 58	"	3 to 3½	" ..	36 20	62	"
Bailey	36 to 51	"	2¼ to 2¾	Bearded ..	36 14	61½	"
Willit's	54 to 60	"	2½ to 3	Beardless.	36 ..	60½	Slightly to considerably.
Democrat.....	45 to 54	Fairly stiff..	2¼ to 3	Bearded ..	34 ..	62¼	Very slightly.
Stewart.....	48 to 56	Stiff	2½ to 3	Beardless.	34 ..	61½	Slightly.
Weld's No. 4.....	53 to 60	"	2¾ to 3¼	" ..	33 40	61	Very slightly.
Roberts	54 to 63	"	2½ to 3½	Bearded ..	28 40	62¼	"
Golden Cross.....	52 to 59	"	2 to 2¾	" ..	27 40	61	"
Manchester.....	54 to 58	Fairly stiff..	2¼ to 3	Beardless.	27 10	61½	Slightly.
Early Red Clawson	52 to 60	Stiff	2¼ to 3	" ..	27 10	60¾	Very slightly.
Martin's Amber...	48 to 58	"	2½ to 3¼	" ..	25 50	60	"
Tasmania	48 to 58	Fairly stiff..	2 to 3	Bearded ..	25 10	61¾	"

EXPERIMENTS WITH SPRING WHEAT.

During the season of 1894, thirty-six varieties of spring wheat were tested, twenty-seven of these were on plots of 1-20th acre each, and nine on plots of 1-40th acre. The land was clay loam adjoining the experimental plots of barley, and received a similar application of manure in the spring of 1891, and of ashes in the autumn of 1893. The preparation of the land also was the same as that for the experimental plots of oats and barley.

Several of the varieties which show a comparatively small yield, would have been reported as giving more liberal returns but for the depredations of sparrows, which were most persistent in their attentions, especially to the later ripening sorts. Particulars of growth, yield, &c., will be found in the following table :—

SPRING WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
			Inches.		Inches.		Bush. Lbs.	Lbs.	
Herisson, Bearded.....	July 31	104	42 to 50	Stiff....	2 to 2 $\frac{1}{2}$	Bearded.	22 40	61 $\frac{1}{2}$	Very slightly.
Golden Drop.....	" 31	104	42 to 48	"....	2 $\frac{3}{4}$ to 3	Beardless.	21 20	58 $\frac{1}{4}$	Considerably.
White Chaff.....	Aug. 1	106	41 to 48	Fair....	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$	"	20	58 $\frac{3}{4}$	Slightly.
Preston.....	July 29	103	42 to 54	Stiff....	3 to 4	Bearded.	19 40	58	Slightly.
Colorado.....	Aug. 1	105	44 to 48	Fair....	3 to 3 $\frac{1}{2}$	"	19	59 $\frac{1}{4}$	Considerably.
Red Fife.....	" 2	106	41 to 46	Stiff....	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	Beardless.	18 20	60 $\frac{3}{4}$	Slightly.
Advance.....	July 30	103	36 to 48	"....	3 to 3 $\frac{3}{4}$	Bearded.	18	58 $\frac{3}{4}$	Very slightly.
Crown.....	" 26	99	36 to 48	"....	3 to 3 $\frac{3}{4}$	"	17 50	58 $\frac{3}{4}$	"
Dion's.....	Aug. 8	112	47 to 50	"....	3 $\frac{1}{4}$ to 4	"	17 10	63	Slightly.
Red Fern.....	" 8	113	52 to 55	"....	3 $\frac{1}{2}$ to 4 $\frac{1}{2}$	"	16 30	62 $\frac{3}{4}$	"
Ladoga.....	July 25	99	35 to 44	Fair....	2 $\frac{3}{4}$ to 3 $\frac{3}{4}$	"	16	57	Slightly.
Huron.....	" 31	104	42 to 48	Stiff....	3 to 3 $\frac{3}{4}$	"	16	57 $\frac{1}{4}$	Considerably.
Dawn.....	" 24	96	36 to 40	"....	3 to 3 $\frac{3}{4}$	Beardless.	16	56 $\frac{3}{4}$	Slightly.
Stanley.....	" 29	102	40 to 50	"....	3 to 3 $\frac{3}{4}$	"	15 50	58 $\frac{3}{4}$	"
Old Red River.....	Aug. 5	109	40 to 48	"....	3 to 3 $\frac{1}{2}$	"	15 30	59	Considerably.
Rideau.....	July 29	102	33 to 45	Fair....	2 $\frac{1}{2}$ to 3 $\frac{3}{4}$	"	15	56 $\frac{1}{4}$	Slightly.
Beaudry.....	Aug. 1	106	42 to 45	"....	2 $\frac{1}{2}$ to 3	Bearded.	15	62	Very slightly.
Percy.....	July 30	103	43 to 52	Stiff....	3 to 3 $\frac{3}{4}$	Beardless.	14 40	58 $\frac{3}{4}$	Very slightly.
Progress.....	" 30	103	43 to 48	"....	3 to 3 $\frac{3}{4}$	"	14 40	58 $\frac{3}{4}$	Slightly.
Wellman's Fife.....	Aug. 5	109	40 to 48	"....	3 to 4	"	14 40	60 $\frac{1}{4}$	"
White Connell.....	" 6	110	32 to 48	"....	3 to 3 $\frac{1}{2}$	"	14	59	Badly.
Dufferin.....	July 26	99	42 to 46	Fair....	3 to 3 $\frac{1}{2}$	Bearded.	13 40	57 $\frac{1}{4}$	Slightly.
Vernon.....	Aug. 1	106	36 to 42	"....	2 $\frac{3}{4}$ to 3 $\frac{1}{4}$	"	13 40	60 $\frac{3}{4}$	Considerably.
White Fife.....	" 4	109	30 to 40	Stiff....	2 $\frac{3}{4}$ to 3	Beardless.	13 40	59 $\frac{3}{4}$	Slightly.
Pringle's Champlain...	" 2	107	41 to 48	"....	3 to 4	Bearded.	13 40	60	"
Alpha.....	" 2	106	31 to 43	"....	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	Beardless.	13 20	59 $\frac{1}{2}$	"
Azima, Russian.....	" 9	113	36 to 42	Fair....	2 $\frac{1}{2}$ to 3	Bearded.	13 10	60	Considerably.
Beauty.....	" 3	106	44 to 54	Stiff....	3 $\frac{1}{4}$ to 4	Beardless.	13	57 $\frac{1}{4}$	"
Goose Wheat.....	" 3	108	39 to 47	"....	2 $\frac{1}{4}$ to 2 $\frac{3}{4}$	Bearded.	12 40	61	Slightly.
Manifold.....	July 29	102	42 to 46	"....	3 to 3 $\frac{3}{4}$	Beardless.	12 20	59 $\frac{1}{4}$	"
Blenheim.....	Aug. 4	108	44 to 52	"....	3 to 4	Bearded.	12 10	58 $\frac{3}{4}$	Considerably.
Countess.....	July 25	98	33 to 48	"....	2 $\frac{3}{4}$ to 3 $\frac{1}{4}$	Beardless.	12 10	59 $\frac{1}{4}$	Slightly.
Admiral.....	Aug. 3	107	36 to 45	"....	2 $\frac{1}{2}$ to 3	"	11 30	58 $\frac{3}{4}$	"
White Russian.....	" 7	112	46 to 50	"....	3 to 4	"	11 30	58 $\frac{3}{4}$	Considerably.
Australian.....	" 3	107	36 to 43	"....	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$	"	11 20	54 $\frac{3}{4}$	Badly.
Ottawa.....	July 24	98	38 to 48	Fair....	3 to 3 $\frac{1}{2}$	Bearded.	11 10	54	Considerably.

EXPERIMENTS WITH PEASE.

Thirteen varieties of pease were sown on plots of 1-20th acre each, excepting the Golden Vine pea, which occupied only 1-40th of an acre. The land on which these were sown was a clay loam adjoining the experimental plots of barley. For particulars as to treatment and preparation of land, see "Experimental plots of Barley."

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					Bush.	Lbs.	Lbs.
Crown	April 23....	Aug. 10....	109	Small.....	34	40	63
Pride	" 23....	" 8....	107	Large	34	40	63½
Prussian Blue	" 23....	" 10....	109	Medium	32	40	63½
Multiplier.....	" 23....	" 10....	109	Small.....	32	10	63½
Centennial.....	" 23....	" 8....	107	Above medium	31	20	62½
Creeper.....	" 23....	" 10....	109	Small.....	31	10	63½
Large White Marrowfat....	" 23....	" 13....	112	Large	30	20	63½
Black Eyed Marrowfat.....	" 23....	" 9....	108	"	30		61½
Prince Albert.....	" 23....	" 13....	112	Small.....	30		63½
Mummy.....	" 23....	" 8....	107	Above medium	28	20	63
New Potter.....	" 23....	" 8....	107	Large	28		62
Canadian Beauty.....	" 23....	" 8....	107	"	28		62½
Golden Vine.....	" 27....	" 12....	107	Small.....	26	40	63½

FIELD CROPS OF PEASE.

Six varieties of pease were sown on larger plots, all on clay loam and in the same field. The previous crop was experimental plots of grain. This land was in meadow from 1889 to 1892 and has received no manure since 1888, when an application of 18 tons per acre was made. It was ploughed in the autumn of 1893 and disc-harrowed and harrowed with smoothing harrow in the spring of 1894, before sowing.

Prussian Blue.—One-half acre ; sown April 24th ; 2½ bushels per acre ; ripe July 31st ; time to mature, 98 days ; yield per acre, 30 bushels 20 lbs ; weight per bushel, 65¼ lbs. ; vines made a fairly strong and even growth.

New Potter.—One-half acre ; sown April 24th ; 2½ bushels per acre ; ripe August 1st ; time to mature, 99 days ; yield per acre, 20 bushels ; weight per bushel, 63 lbs. ; pea large, vines rather long and fairly strong in growth. The land was flat and this plot suffered in spots from water lying on the ground owing to the frequent rains.

Creeper.—One-half acre ; sown April 24th ; 2½ bushels per acre ; ripe July 30th ; time to mature, 98 days ; yield per acre, 25 bushels 40 lbs.; weight per bushel, 64½ lbs.; vines short, pea small ; much like the variety known as Crown.

Canadian Beauty.—One-third acre ; sown April 24th ; 3 bushels per acre ; ripe August 1st ; time to mature, 99 days ; yield per acre, 12 bushels 17 lbs.; weight per bushel, 63 lbs. This is a large pea and the vine is a strong, vigorous grower.

Large White Marrowfat.—1½ acres ; sown April 24th ; 3 bushels per acre ; ripe August 1st ; time to mature, 99 days ; yield per acre, 12 bushels 5 lbs.; weight per bushel, 62¾ lbs. A large pea ; vines made strong growth ; was considerably injured in spots by water, owing to excessive rains followed by hot sun.

Mummy.—2¼ acres ; sown April 24th ; 3 bushels, per acre ; ripe July 31st ; time to mature, 98 days ; yield per acre, 28 bushels 38 lbs.; weight per bushel, 65 lbs. Pea above medium size ; vine a strong, coarse, upright grower.

All these plots, excepting Prussian Blue, were more or less injured by water, on account of frequent rains and the compact nature of the soil not permitting the water to be carried off promptly by the under drains.

EXPERIMENTS WITH CORN.

Twenty-two varieties of Indian corn were tested as to earliness and yield of fodder. The land was sandy loam, which had a light coating of manure in the spring of 1893,

about ten tons to the acre. The previous crop was oats. The land was ploughed in the autumn of 1893, and disc-harrowed and harrowed with smoothing harrow before sowing, in spring of 1894. The area occupied by each sort was two rows three feet apart and 80 feet long. The estimate of yield has been based on the weight of the two rows 50 feet long.

The varieties numbered 18, 30 and 43 are cross-bred sorts which have been produced at the Central Experimental Farm by fertilizing Mitchell's Extra Early with pollen of the Rural Thoroughbred White Flint.

The sowing of all took place on May 23rd, and the following table shows the results obtained :—

CORN—TEST OF VARIETIES.

Name of Variety.	Description of Variety.	Height.	Leafiness.	When Tassel- led.	In Silk.	Condition when Cut.	Weight Per Acre, Grown in Rows.
		Inches.					Tons. Lbs.
Rural Thorough-bred							
White Flint	White Flint	108 to 120	Very leafy ..	Aug. 10.	Aug. 16.	Early milk..	26 127
Evergreen Red Cob	" Dent	108 to 114	Leafy	" 20.	" 22.	"	25 530
Gold Medal Dent	Yellow Dent	84 to 96	"	" 1.	" 9.	"	21 544
Angel of Midnight	" Flint	78 to 96	"	July 28.	" 2.	Nearly ripe.	
North Dakota (C. E. F. Seed)	White Flint	84 to 96	"	" 25	July 30.	"	20 1,382
No. 18 (C. E. F. Seed)	"	84 to 96	"	" 29.	Aug. 4.	Late milk..	20 656
No. 43 (C. E. F. Seed)	"	84 to 90	"	" 27.	Aug. 4.	Late milk..	19 1,785
No. 30 (C. E. F. Seed)	"	78 to 84	Very leafy ..	" 26.	July 30.	Leafy	19 1,204
Early Yellow Long Eared.	Yellow Flint	84 to 96	Leafy	" 26.	" 30.	Late milk..	19 623
Extra Early Huron Dent.	" Dent	84 to 96	"	" 28.	Aug. 3.	"	19 478
Compton's Early	" Flint	78 to 93	"	" 28.	" 2.	Early milk..	18 665
Livingstone's Gold Coin..	" Dent	78 to 96	Fairly leafy.	" 27.	" 1.	Nearly ripe.	18 155
Smut Nose	Pink Flint..	84 to 96	"	Aug. 16.	" 19.	Early milk..	16 815
North Dakota	White Flint	72 to 84	Leafy	July 26.	July 30.	Late milk..	16 234
Early Small Auxonne....	Yellow Flint	72 to 84	"	" 25.	" 30.	Nearly ripe.	15 1,364
Smut Nose	Pink Flint..	78 to 90	Fairly leafy.	" 25.	" 28.	"	15 637
Early White Pyrenean...	White Flint	84 to 90	"	" 25.	Aug. 1.	"	14 1,476
Longfellow	Yellow Flint	75 to 90	Leafy	" 19.	July 22.	"	13 1,588
Sanford	White Flint	72 to 90	Fairly leafy.	" 27.	Aug. 1.	"	13 1,443
Pearce's Prolific	Yellow Flint	69 to 84	Leafy	" 25.	July 30.	"	13 644
No. 2 from A. L. Howard.	" Flint	66 to 81	Fairly leafy.	" 24.	" 28.	"	13 136
Indian Corn. (Vilmorin)..	White Flint	66 to 78	"	" 21.	" 25.	Ripe	11 651
No. 1 from A. L. Howard.	Yellow Flint	66 to 81	"	" 20.	" 22.	"	10 764
Mitchell's Extra Early...	White Flint	57 to 69	"	" 23.	" 26.	"	10 328
				" 19.	" 21.	"	9 1,457

EXPERIMENTS WITH TURNIPS.

Fifteen varieties of turnips were tested on plots adjoining each other, all having similar treatment. The soil was light sandy loam. The previous crop was oats. On these plots 150 lbs. of Royal Canadian Fertilizer was used per acre, applied on top of drills. The seed was sown in drills 2½ feet apart; and the yield of the crop has been calculated from the quantity obtained from two rows, each 90 feet long. Two sowings were made of each sort of seed, the first on May 12th, and the second on June 12th. The results are given in the following table. It will be observed that in all cases but one the earlier sown plots gave the largest yields.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Simmer's Champion Purple Top.....	25	142	835	42	10	19	333	58
Purple Top Swede.....	23	1,238	787	18	10	19	333	58
Bloomsdale Swede.....	22	915	748	35	6	1,552	225	52
Monarch or Oval.....	18	471	607	51	11	1,369	389	29
Imperial Swede.....	18	217	603	37	11	1,025	383	45
Skirving's Swede.....	18	106	601	46	9	973	316	13
East Lothian ..	17	509	575	9	7	423	240	23
Hartley's Bronze Top.....	17	267	571	7	8	1,134	285	34
Carter's Elephant Swede.....	14	653	477	33	6	1,842	230	42
Rennie's Prize Purple Top.....	14	120	468	40	5	1,422	190	22
Snow White Globe.....	13	1,104	451	44	14	653	477	33
Westbury Imperial Swede.....	13	1,007	450	7	9	669	311	9
Elephant or Giant King.....	10	1,393	356	33	5	1,713	195	13
Jumbo or Monarch.....	10	503	350	6	4	1,486	158	6
Marquis of Lorne....	9	1,844	330	44	6	1,842	230	42

FIELD CROP OF TURNIPS.

One acre only was sown as a field crop. The soil was a light sandy loam ; the previous crop was wheat. This land received an application of 200 lbs. per acre of Royal Canadian Fertilizer, which was applied on top of drills. It was ploughed in the autumn of 1893 ; gang-ploughed and harrowed in the spring of 1894. The drills were 2 feet apart. Variety, Prize Purple Top Swede. Sown, June 12th ; came up June 16th ; and was pulled Oct. 29th ; yield, 22 tons, 1,249 lbs.

EXPERIMENTS WITH MANGELS.

Eleven varieties of mangels were tested in adjoining plots, soil sandy loam. The previous crop was oats. Two sowings were made in each case, in drills 2½ feet apart, the first on April 27th, the second on May 11th, and the crops on both were pulled on October 15th. The variety chosen for this test was Mammoth Long Red. The yields in this case were also larger in every instance from the earlier sown plots. The returns have been calculated from the weight of roots obtained from two rows, each 90 feet long.

MANGELS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Evan's Mammoth Long Red.....	27	14	900	14	20	559	675	59
Canadian Giant.....	25	530	842	10	19	139	635	39
Yellow Globe Selected.....	23	1,626	793	46	17	1,042	584	2
Improved Mammoth Long Red.....	22	1,883	764	43	20	559	675	59
Golden Tankard.....	21	1,850	730	50	13	330	438	50
Bruce's Mammoth Long Red.....	21	1,366	722	46	10	425	340	25
Giant Yellow Intermediate.....	20	1,043	684	3	17	896	581	36
Giant Yellow Intermediate.....	20	656	677	36	11	1,474	391	14
Carter's Warden Orange Globe.....	19	623	643	43	16	815	546	55
Red Fleshed Tankard.....	17	316	571	56	14	992	483	12
Red Globe.....	16	1,977	566	17	13	1,878	464	38

FIELD CROPS OF MANGELS.

Mammoth Long Red or Gatepost. One acre of this variety was sown on heavy sandy loam, the previous crop was mixed grain. The land was ploughed in the autumn of 1893, and gang-ploughed and harrowed with the smoothing harrow in the spring of 1894. On these plots, 150 lbs. of Royal Canadian Fertilizer were used per acre applied on top of drills. The seed was sown in drills $2\frac{1}{2}$ feet apart on May 3rd; came up May 13th; pulled October 17th. Yield 21 tons 150 lbs.

A second acre of the same variety was sown on land adjoining, of the same character, which was prepared and fertilized in the same way as that last mentioned. The seed was sown May 3rd; came up May 13th, and the mangels were pulled October 16th. Yield 21 tons 1,248 lbs.

A third acre also of Mammoth Long Red was sown on light sandy loam, the previous crop was wheat. The land received the same treatment as the last two plots referred to. The seed was sown May 9th; came up May 19th, and the roots were pulled October 12th. Yield 15 tons 1,905 lbs.

EXPERIMENTS WITH CARROTS.

Fifteen varieties of these roots were sown, on adjoining plots in rows eighteen inches apart. The soil was a light sandy loam, and the previous crop was oats. The land received a dressing this spring of Royal Canadian Fertilizer, applied on the top of the drills, at the rate of 150 lbs. per acre.

Two plots of each sort were sown, the first on April 27th, the second on May 11th, and the roots on both were pulled on October 12th. The yield in each case has been calculated from the product of two rows each 90 feet long. With these plots also, all those earlier sown gave a much larger yield than those sown later.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth White Intermediate.....	28	386	939	46	14	1,282	488	2
Iverson's Champion.....	22	1,496	758	16	13	1,830	463	50
Pearce's Improved Half Long White.....	22	770	746	10	11	1,797	396	37
Improved Short White.....	20	1,785	696	25	11	183	369	43
White Belgian.....	20	817	680	17	9	1,037	317	17
Guerande or Ox Heart.....	18	1,913	631	53	12	281	404	41
Early Gem.....	16	1,557	559	17	14	72	467	52
Scarlet Half Long Stump Rooted.....	14	1,040	484		12	1,168	419	28
Evan's Half Long White.....	14	556	475	56	10	1,377	356	17
Giant Short White Vosges..	13	701	445	1	10	1,619	360	19
St. Valery.....	13	701	445	1	8	1,827	297	7
Orange Giant.....	13	459	440	59	10	973	349	33
Large Short White Vosges..	12	1,652	427	32	7	1,327	255	27
Large Scarlet Altringham.....	10	1,941	365	41	8	375	272	55
Large White Belgian.....	10	5	333	25	9	473	307	53

FIELD CROPS OF CARROTS.

$\frac{1}{2}$ acre. Soil, light sandy loam; previous crop was wheat; ploughed in autumn of 1893; gang-ploughed and harrowed in spring of 1894; drills 2 feet apart; dressed with Royal Canadian Fertilizer, 200 lbs. to the acre, applied on the crest of the drills immediately after sowing. Variety, Improved Short White; sown April 27th; came up May 10th; pulled October 15th; yield per acre, 24 tons 1,960.

$\frac{1}{2}$ acre. Soil, sandy loam ; previous crop was wheat ; ploughed in autumn of 1893 ; gang-ploughed and harrowed in spring of 1894 ; drills 2 feet apart ; dressed with Royal Canadian Fertilizer, 200 lbs. per acre, applied on the crest of the drills immediately after sowing. Variety, Mammoth White Intermediate ; sown April 27th ; came up May 10th ; pulled October 16th ; yield per acre, 24 tons 840 lbs.

1 acre. Soil, heavy sandy loam ; previous crop was grain ; ploughed in the autumn of 1893 ; gang-ploughed and harrowed in spring of 1894 ; drills 2 feet apart. Variety, Improved Short White ; sown May 1st ; came up May 13th ; pulled October 30th ; yield 29 tons 1,403 lbs.

1 acre adjoining the above. Soil and treatment the same. Variety, Mammoth White Intermediate ; sown May 1st ; came up May 13th ; pulled October 25th ; yield 27 tons 106 lbs.

EXPERIMENTS WITH SUGAR-BEETS.

Six varieties of sugar-beets have been under comparative test, on adjoining plots alongside of the carrot plots, on similar light sandy loam, the treatment of which was the same, both as to preparation and fertilizing. The seed was sown in rows eighteen inches apart, and the yield has been calculated from the product of two rows, each 90 feet long. Two sowings of the seed were made : the first, on April 27th, the second, on May 11th, and the crops on both were pulled on October 15th. The earlier sown plots gave in every instance the larger yield.

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
French, very rich.....	20	1,624	693	44	15	8	500	8
White Green Top Brabant Improved.....	20	1,059	684	19	12	845	414	5
Vilmorin's Improved.....	17	1,816	596	56	13	217	436	57
Klein Wanzleben.....	17	1,171	586	11	12	523	408	43
French Red Top Improved.....	16	428	540	28	10	1,215	353	35
White Improved.....	16	186	536	26	12	361	406	1

EXPERIMENTS WITH POTATOES.

Fifty-two varieties of potatoes have been grown on adjoining plots with the object of gaining information as to their relative earliness, productiveness and quality. The soil in which they were planted was a sandy loam which was manured in the spring of 1893 with a light coating of barnyard manure, at the rate of 10 to 12 tons per acre. The potatoes for planting were cut into pieces with two to three eyes each and planted in rows $2\frac{1}{2}$ feet apart, and 1 foot apart in the rows. They were all planted on May 21st and 22nd, and dug on Sept. 18th and 19th, and the yield per acre has been calculated in each case from the weight of tubers obtained from two rows, each 66 feet long. No rot was observed in any of the varieties this season.

POTATOES, test of Varieties.

Name of Variety.	Average Size.	Total Yield per Acre.	Yield per Acre of Marketable.	Yield per Acre of Un-marketable.	Form and Colour.
		Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	
Burpee's Extra Early..	Large	364 6	334 24	29 42	Pink and white.
Everett.....	"	357 30	338 48	18 42	Rose.
Burnaby Seedling.....	"	356 24	327 48	28 36	Pink and white.
Polaris.....	"	339 54	323 24	16 30	White.
Russell's Seedling.....	Medium....	328 54	251 54	77	"
White Beauty.....	Med.to large	324 30	305 48	18 42	"
Lee's Favourite.....	Large	315 42	286	29 42	Pink.
Early Sunrise.....	"	314 36	282 42	31 54	"
Pearce's Extra Early.....	"	313 30	283 48	29 42	Pink and white.
Holborn Abundance.....	"	312 24	292 36	19 48	White.
Chicago Market.....	"	308	287 6	20 54	Pink.
Rural Blush	Medium....	308	272 48	35 12	"
American Giant.....	Large	305 48	261 48	44	White.
State of Maine.....	"	301 24	282 42	18 42	"
Early Thorburn.....	Med.to large	298 6	265 6	33	Pink and white.
Sharpe's Seedling.....	Large	286 29	268 49	17 40	"
Daisy	"	286 24	269 5	17 19	"
Beauty of Hebron.....	"	281 36	257 24	24 12	"
Thorburn.....	"	279 24	253	26 24	"
Early Rose.....	"	277 12	259 36	17 36	Pink.
Northern Spy.....	Med.to large	276 6	258 30	17 36	Bright pink.
Vanier	Medium....	273 54	247 30	26 24	Red.
London.....	Med.to large	272 48	198	74 48	Pink.
Empire State.....	Large	269 30	245 18	24 12	White.
Clarke's No. 1.....	Med.to large	268 24	238 42	29 42	Pink.
Munroe County.....	Medium....	266 12	226 36	39 36	"
Vick's Extra Early	Large	262 54	244 12	18 42	Pink and white.
Dakota Red.....	"	258 30	244 12	14 18	Red.
Blue Cup.....	Med.to large	253	231	22	Purple and white
Seattle	Large	251 54	235 24	16 30	White.
Lizzie's Pride.....	Medium....	246 24	211 12	35 12	Pink, red eye.
New Variety No. 1.....	"	242	229 54	12 6	White
Earliest of All.....	"	237 36	171 36	66	Pink and white.
Hale's Champion.....	Med.to small	235 24	145 12	90 12	White.
Chas. Downing.....	Medium....	226 36	177 6	49 30	"
Crown Jewel.....	Med.to large	225 30	201 18	24 12	Pink and white.
Early Ohio.....	Medium....	223 18	196 54	26 24	Pink.
I. X. L.....	Large	220	198	22	Pink and white.
Delaware	Medium....	217 48	189 12	28 36	White.
Early Gem.....	"	213 24	181 30	31 54	Pink.
McKenzie	"	205 42	176	29 42	White.
Algoma No. 1.....	Med.to large	195 48	178 12	17 36	Pink.
Bras d'Or Seedling.....	Medium....	193 36	162 48	30 48	Purple.
Green Mountain.....	"	137 48	109 12	28 36	White.
Flemish Beauty Seedling	Large	137 30	97 54	39 36	Bright pink.
Seedling No. 214.....	Small	128 42	91 18	37 24	White.
Hopeful.....	Medium....	122 6	111 6	11	"
Queen of the Valley.....	Med.to large	118 30	102	16 30	Pink.
Harbinger	Medium....	115 30	92 24	23 6	Pale pink.
Pearce's Prize Winner.....	"	99	81 24	17 36	Pink.
Seedling No. 24.....	Small to med	81 24	44	37 24	White.
Seedling No. 25.....	Small	80 18	60 30	19 48	"

SUMMARY OF CROPS GROWN ON THE CENTRAL EXPERIMENTAL FARM DURING THE YEAR 1894.

	Tons.	Lbs.
Hay.....	200	.....
Clover, cut green and put into silo.....	10	1,300
Indian Corn, cut for ensilage.....	225	1,116
Indian Corn and Horse Beans grown together and cut for ensilage.....	55	1,165
Horse Beans grown separately and cut for ensilage.....	66	790
Sunflower heads, used in ensilage.....	8	1,475
Mixed crop, cut green and cured as hay.....	7	1,390
Mixed crop, cut ripe.....	17	1,290
Turnips.....	38	64
Carrots.....	99	228
Mangels.....	77	1,962
Sugar Beets.....	17	283
Total.....	824	1,063
	Bush.	Lbs.
Wheat.....	27	50
Rye.....	141	26
Oats.....	1,564	30
Barley.....	268	5
Pease.....	163	3
Potatoes.....	322	41
Total.....	2,487	35

In the estimate of grain, the products of the small test plots are not included.

TESTS OF THE VITALITY OF GRAIN AND OTHER SEEDS.

During the season of 1894 the number of samples of seed grain and agricultural seeds tested and reported on was 2,157. The average vitality of the more important cereals has been higher than last year: wheat showing a percentage of growth of 90·5 for 1894, as against 81·8 in 1893. Oats also stand well, showing the very high average of 95·5 in 1894, as against 93 in 1893. Barley 89, as against 84·9 in 1893; and pease 79·5, as against 65·7. Showing that the harvest weather throughout the Dominion was more generally favourable in 1894.

The fact that some of the samples of oats showed under 11 per-cent of germinating power, wheat under 12 and barley under 24 per cent, shows that the conditions have not been universally favourable, and indicates also the necessity for such yearly tests, so that farmers who suffer from bad harvest weather may receive the information they need to guide them in selecting suitable grain for seed. Where the vitality of the samples received is low, the farmers sending them are advised to feed such cereals and buy grain for seed with a much higher percentage of vitality. This timely information prevents many from sowing poor seed, which would be certain to give poor returns. Every farmer who desires to have samples tested should forward them in good season, sending not less than one ounce in each case. These can be sent to the Central Experimental Farm at Ottawa free through the mail, and the tests of vitality can usually be completed and reported on within a fortnight after they are received.

The building in which these tests are conducted is shown below (Fig. 2); there also the distribution of samples of seed for testing is carried on.

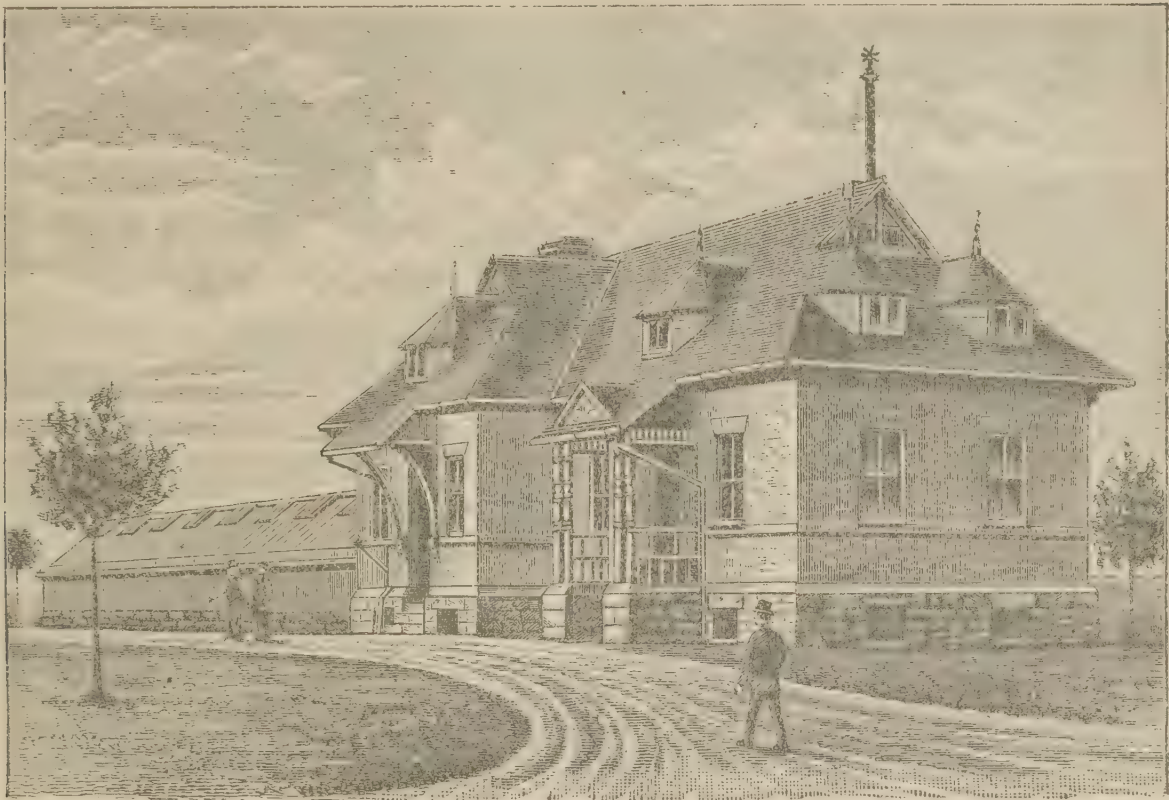


Fig. 2.

RESULT of Tests of seeds for vitality, 1893-94.

Kind of Seeds.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Average Vitality.
Wheat.....	547	100·0	12·0	83·8	6·7	90·5
Barley.....	512	100·0	23·0	70·2	18·8	89·0
Oats.....	854	100·0	32·0	91·4	4·1	95·5
Rye.....	4	96·0	50·0	71·5	7·7	79·2
Pease.....	167	100·0	4·0			79·5
Corn.....	9	100·0	4·0			84·4
Clover.....	5	84·0	59·0			73·2
Grass.....	11	87·0	0·0			61·0
Beans.....	4	84·0	40·0			68·5
Turnips.....	15	100·0	19·0			82·0
Mangels.....	9	82·0	14·0			48·4
Carrots.....	4	96·0	1·0			44·0
Sugar Beet.....	4	70·0	54·0			62·5
Sunflowers.....	3	90·0	62·0			79·3
Cabbage.....	3	97·0	85·0			92·3
Flax.....	2	93·0	91·0			92·0
Wild Rice.....	2	0·0	0·0			0·0
Beets.....	1	45·0	45·0			45·0
Tares.....	1	54·0	54·0			54·0
Total number of samples tested, highest and lowest percentage.	2,157	100·0	0·0			

The following tables show the results of the tests of the more important cereals made for each province with the number of tests in each case.

TABLE showing Results of Grain Tests for each Province.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
<i>Ontario—</i>						
Wheat.....	126	100·0	42·0	77·7	10·9	88·7
Barley.....	116	100·0	50·0	72·1	16·3	88·4
Oats.....	238	100·0	35·0	91·2	4·7	96·0
<i>Quebec—</i>						
Wheat.....	179	100·0	60·0	86·9	4·4	91·4
Barley.....	208	100·0	23·0	66·0	21·8	87·9
Oats.....	251	100·0	54·0	90·5	3·1	93·7
<i>Manitoba—</i>						
Wheat.....	78	100·0	28·0	84·2	5·9	90·1
Barley.....	33	100·0	67·0	64·7	28·2	92·9
Oats.....	85	100·0	50·0	89·2	5·6	94·8
<i>North-west Territories—</i>						
Wheat.....	71	100·0	12·0	83·3	7·9	91·2
Barley.....	47	100·0	33·0	82·8	10·3	93·1
Oats.....	83	100·0	32·0	93·7	2·1	95·8
<i>Nova Scotia—</i>						
Wheat.....	23	100·0	59·0	83·5	4·7	88·2
Barley.....	44	100·0	31·0	73·8	12·0	85·8
Oats.....	61	100·0	52·0	86·6	4·9	91·5
<i>New Brunswick—</i>						
Wheat.....	43	100·0	54·0	85·5	4·2	89·7
Barley.....	41	100·0	40·0	61·0	28·3	89·3
Oats.....	99	100·0	76·0	91·4	4·6	96·0
<i>Prince Edward Island—</i>						
Wheat.....	23	99·0	54·0	82·1	5·6	87·7
Barley.....	12	99·0	74·0	85·0	6·2	91·2
Oats.....	28	100·0	76·0	87·9	5·9	93·8
<i>British Columbia—</i>						
Wheat.....	6	100·0	96·0	91·3	6·0	97·3
Barley.....	11	100·0	87·0	94·6	·9	95·5
Oats.....	9	100·0	91·0	95·1	1·1	96·2

METEOROLOGICAL OBSERVATIONS.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1894 ; maximum, minimum and mean temperature for each month, with date of occurrence ; also rainfall and snowfall :—

—	Maximum.	Date.	Minimum.	Date.	Mean.	Rain-fall.	Snow-fall.
	°		°		°	in.	in.
January.....	41·0	4th	—16·2	26th	13·0	.....	34·00
February.....	38·5	19th	—25·7	24th	11·06	.....	10·50
March.....	54·2	19th	3·5	27th	31·2	1·03	6·00
April.....	73·4	27th	13·0	2nd	46·2	·82	.....
May.....	83·8	1st	35·5	12, 14 & 15	56·0	2·63	.....
June.....	91·0	16th	36·2	6th	66·6	6·19	.....
July.....	93·0	20th	47·0	8th	68·9	3·57	.....
August.....	89·6	14th	42·0	21st	62·4	1·46	.....
September.....	82·3	4th	29·5	26th	60·1	2·19	.....
October.....	65·5	28th	33·8	7th & 15th	47·7	3·13	.....
November.....	51·6	3rd	1·5	29th	29·5	1·55	8·0
December.....	45·8	17th	—24·5	29th	21·3	·48	13·0
						23·05	71·50

Rain or snow fell on 173 days during the 12 months.
Heaviest rainfall in 24 hours, 1·19 inches, on June 20th.
Heaviest snowfall in 24 hours, 22 inches, on January 30th.
During July rain fell on 15 days, and on 16 days in November.
April and August show the lowest number of days on which rain fell during the season. viz. : 7 and 9 days respectively.

WILLIAM T. ELLIS.

TESTS OF THE ACTION OF FERTILIZERS ON SOME CROPS.

In the Annual Report of the Experimental Farms for 1893, details are given on pages 8 to 24 of the results of a series of tests which were carried on during the previous five or six years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important crops. The particulars there given covered the results of six years experience with crops of wheat and indian corn and five years experience with crops of oats, barley, turnips and mangels. The experience was also given as to the results of similar tests conducted for three years with carrots and one year with sugar beets.

These experiments are being continued ; and as explanatory regarding the preparations made and the general plan, together with the way in which it has been carried on the following paragraphs are quoted from the report of 1893.

“ A piece of sandy loam, more or less mixed with clay, which was originally covered with heavy timber, chiefly white pine, was chosen for these tests. The timber was cut many years ago, and among the stumps still remaining when the land was purchased, there had sprung up a thick second growth of trees, chiefly poplar, birch and maple, few of which exceeded six inches in diameter at the base. Early in 1887, this land was cleared by rooting up the young trees and stumps and burning them in piles on the ground from which they were taken, the ashes being afterwards distributed over the soil as evenly as possible, and the land ploughed and thoroughly harrowed. Later in the season it was again ploughed and harrowed, and most of it got into fair condition for cropping.”

"The plots laid out for the experimental work with fertilizers were one-tenth of an acre each, 21 of which were devoted to experiments with wheat, 21 to barley, 21 to oats, 21 to Indian corn or maize, and 21 to experiments with turnips and mangels. Owing to the difficulty and unavoidable delay attending the draining of some wet places, it was not practicable to undertake work on all the plots the first season. The tests were begun in 1888 with 20 plots of wheat and 16 of Indian corn; and in 1889 all the series were completed excepting six plots of roots, Nos. 16 to 21 inclusive, which were available for the work in 1890." In all cases the plots in each series have been sown on the same day.

"In 1890 it was found that all the grain plots had become so weedy that the growth of the crops was much interfered with, and with the view of cleaning the land one-half of each of the wheat and oat plots was sown with carrots in 1891, and one-half of each of the barley plots with sugar beets. In 1892 the other half of each plot in each of these series was sown with carrots. In 1893 it was thought desirable to continue this cleaning process, and carrots were again sown on the half of the wheat and oat plots occupied with this crop in 1891, and also on the half of the barley plots cropped with sugar beets that year." In 1894 the one half of the oat plots was sown again with carrots and the half of the plots devoted to wheat and barley have been planted with potatoes.

TREATMENT OF SOIL.

"The treatment of the soil on all the grain plots has been to gang-plough soon after harvest, and after the shed grain and weeds have well started to plough again about 7 inches deep. In spring the plots have been disc-harrowed twice before applying the fertilizers and again harrowed with the toothed or smoothing harrow before sowing. On those plots where barnyard manure has been used, the manure has been lightly ploughed under as soon as possible after it has been spread on the land and harrowed with the smoothing harrow before sowing. Wherever barnyard manure is spoken of it is understood to be a mixture of horse and cow manure in about equal proportions."

It is proposed to give each year in the annual report a summary of these permanent fertilizer plots, taking the average yield of the whole of the previous period adding the results of the current year and then giving the average yield for the full time. The experience of each year will add materially to the value and reliability of the tests for the whole period.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of $1\frac{1}{2}$ bushels per acre; and the varieties used were as follows. In 1888-89 and '91 white Russian, and in 1892-93 Campbell's White Chaff. In 1894 the Rio Grande wheat was sown April 19th, came up April 29th and was ripe August 8th requiring from the date of sowing to maturity a period of 111 days. Shortly before sowing the Rio Grande it was tested as to vitality and found to be very deficient in germinating power, less than half the kernels sprouted. As it was not practicable then to secure better seed, double the usual quantity of seed was sown namely: three bushels per acre, which gave a proportion of growth on each plot of about the usual thickness.

The season of 1894 at Ottawa has been more favourable for the growing of spring wheat than any other season during the seven years these tests have been carried on excepting that of 1891, and the yields taken as a whole are about one third above the average. This year the plot on which the rotted manure was used has yielded at the rate of 2 bushels 29 lbs per acre more than that on which the fresh manure was used. This gain however is not sufficient to offset the previous gains of the fresh manure plot and it still averages a little better than any other plot in the series.

EXPERIMENTS with Fertilizers on Plots of Wheat $\frac{1}{10}$ acre each.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR SIX YEARS.		7TH SEASON, 1894. VARIETY, RIO GRANDE.		AVERAGE YIELD FOR SEVEN YEARS.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre	Per acre	Per acre	Per acre	Per acre	Per acre
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888 ; 15 tons per acre each year since.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
		16 8 $\frac{1}{2}$	3,180	25 ..	4,130	17 24 $\frac{3}{4}$	3,316
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888 ; 15 tons per acre each year since.	16 43 $\frac{1}{2}$	3,004	22 31	4,830	17 33	3,265
3	Unmanured.....	9 31 $\frac{3}{8}$	1,818	13 40	2,050	10 7 $\frac{1}{2}$	1,851
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	9 54 $\frac{1}{8}$	1,665	12 50	2,210	10 19 $\frac{2}{7}$	1,743
5	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. per acre	11 36 $\frac{2}{3}$	2,749	15 50	3,790	12 12 $\frac{6}{7}$	2,898
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre ; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using.	14 10 $\frac{5}{8}$	2,062	22 10	3,540	15 19 $\frac{2}{7}$	2,787
7	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs ; wood ashes, unleached, 1,000 lbs. per acre. . .	9 34 $\frac{1}{8}$	2,291	21 40	3,710	11 19 $\frac{1}{4}$	2,494
8	Mineral phosphate, untreated, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.....	9 17 $\frac{1}{2}$	1,539	13 50	2,140	9 56 $\frac{2}{7}$	1,627
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	10 39 $\frac{1}{8}$	1,637	12 10	1,470	10 52 $\frac{1}{4}$	1,613
10	Mineral superphosphate, No. 1, 350 lbs. ; nitrate of soda, 200 lbs. per acre . . .	12 6 $\frac{2}{3}$	2,750	14 10	4,110	12 24 $\frac{2}{3}$	2,944
11	Mineral superphosphate, No. 1, 350 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.....	11 36 $\frac{2}{3}$	2,190	18 50	3,330	12 38 $\frac{4}{7}$	2,353
12	Unmanured....	9 5	1,477	14 40	1,970	9 52 $\frac{6}{7}$	1,547
13	Bone finely ground, 500 lbs. per acre . . .	9 28 $\frac{1}{3}$	1,585	15 20	2,200	10 17 $\frac{1}{4}$	1,673
14	Bone finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.....	11 39 $\frac{1}{6}$	1,843	18 30	2,410	12 37 $\frac{4}{7}$	1,924
15	Nitrate of soda, 200 lbs. per acre.....	12 10 $\frac{5}{8}$	2,162	19 ..	2,930	13 9 $\frac{2}{7}$	2,272
16	Muriate of potash, 150 lbs. per acre.....	12 51 $\frac{3}{8}$	1,840	16 50	1,890	13 26 $\frac{4}{7}$	1,816
17	Sulphate of ammonia, 300 lbs. per acre....	10 48 $\frac{1}{2}$	2,380	13 50	2,580	11 14 $\frac{1}{4}$	2,409
18	Sulphate of iron, 60 lbs. per acre.....	11 22 $\frac{1}{2}$	1,990	15 ..	1,680	11 53 $\frac{1}{4}$	1,946
19	Common salt (Sodium chloride) 300 lbs. per acre	10 16 $\frac{2}{3}$	1,586	15 30	1,580	11 1 $\frac{1}{4}$	1,585
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.....	11 18 $\frac{1}{3}$	1,854	13 20	1,810	11 35 $\frac{5}{7}$	1,848
21	Unmanured in 1889, mineral superphosphate, No. 2, 500 lbs. per acre, each year since.	11 8	1,735	15 ..	1,670	11 41 $\frac{1}{4}$	1,726

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889, 1890 and 1891, 1 $\frac{1}{2}$ bushels in 1892 and 1893, and two bushels in 1894. Two-rowed barley has been used for seed throughout the whole period. The varieties used were as follows : 1889, 1890 and 1891, Saale ; 1892, Goldthorpe ; 1893, Duckbill ; and in 1894, Canadian Thorpe, a selected form of the Duckbill. In 1894, the Canadian Thorpe was sown April 19th, came up April 27th, and was harvested July 28th, requiring from the date of sowing to maturity a period of 100 days.

The yield of the barley plots in 1894 is a little under the average of past seasons. The plot fertilized with fresh barn-yard manure continues to give a better yield with this crop than the manure well rotted, better also than any of the artificial fertilizers either single or combined. The common salt *Sodium chloride* continues to give good returns.

EXPERIMENTS with Fertilizers on Plots of Barley, $\frac{1}{10}$ acre.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR FIVE YEARS.		6TH SEASON, 1894, VARIETY CANADIAN THORPE.		AVERAGE YIELD FOR SIX YEARS.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre	Per acre	Per acre	Per acre	Per acre	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure well rotted, 15 tons per acre.....	28 47 $\frac{3}{8}$	2854	31 32	2350	29 20 $\frac{5}{8}$	2770
2	Barn-yard manure, fresh, 15 tons per acre.	29 41 $\frac{1}{8}$	3121	38 16	2680	31 13	3047
3	Unmanured.....	13 47	1624	14 38	1170	14 5 $\frac{3}{8}$	1548
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	15 6 $\frac{3}{8}$	1520	8 26	910	14 1 $\frac{5}{8}$	1418
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre.....	19 9 $\frac{3}{8}$	2292	20 40	2010	19 22 $\frac{3}{8}$	2245
6	Barn-yard manure partly rotted, and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using...	25 18	2449	23 23	1930	25 2 $\frac{1}{8}$	2362
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.....	21 14 $\frac{3}{8}$	2417	25 40	2440	22 2 $\frac{5}{8}$	2421
8	Mineral phosphate, untreated, finely ground, 500 lbs; wood ashes unleached, 1,500 lbs. per acre.....	17 23	1747	14 18	1150	16 46 $\frac{1}{8}$	1647
9	Mineral superphosphate No. 1, 500 lbs. per acre.....	21 ..	2350	14 28	1040	19 44 $\frac{3}{8}$	2132
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.....	23 15	2426	24 28	2190	23 25 $\frac{1}{8}$	2387
11	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	21 43	2583	25 10	2400	22 21 $\frac{3}{8}$	2552
12	Unmanured.....	13 33	1395	10 20	800	13 6 $\frac{5}{8}$	1296
13	Bone, finely ground, 500 lbs. per acre....	15 34	1387	10 30	810	14 8	1291
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	20 5	2032	20 10	1540	20 5 $\frac{5}{8}$	1950
15	Nitrate of soda, 200 lbs. per acre.....	22 8	2754	23 46	2360	22 22 $\frac{3}{8}$	2688
16	Muriate of potash, 150 lbs. per acre.....	21 28	2124	21 12	1600	21 25 $\frac{3}{8}$	2087
17	Sulphate of ammonia, 300 lbs. per acre...	18 47	2351	19 8	1790	19 3 $\frac{3}{8}$	2257
18	Sulphate of iron, 60 lbs. per acre.....	19 43	2107	12 44	1020	18 35 $\frac{1}{8}$	1926
19	Common salt (Sodium chloride) 300 lbs. per acre.....	27 10	2125	21 22	1510	26 12	2022
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre.....	22 43	1971	15 10	1170	21 29 $\frac{3}{8}$	1887
21	Mineral superphosphate No. 2, 500 lbs. per acre.....	21 44	1913	14 18	1080	20 31 $\frac{1}{8}$	1774

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was 2 bushels in 1889 and 1890; $1\frac{1}{2}$ bushels in 1891, 1892 and 1893, and 2 bushels in 1894. The varieties used were as follows: In 1889, Early English; 1890, 1891, 1892, 1893, Prize Cluster; and in 1894, Banner. The Banner was sown April 19th, came up April 29th, and was harvested July 28th, requiring from the date of sowing to maturity a period of 100 days. While individual plots have varied somewhat, the yield of oats has been a little higher, on the whole, during 1894, than the average of the five years past.

EXPERIMENTS with Fertilizers on plots of Oats, $\frac{1}{10}$ th acre.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR FIVE YEARS.		6TH SEASON, 1894. VARIETY— BANNER.		AVERAGE YIELD FOR SIX YEARS.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre.	Per acre.	Per acre.	Per acre.	Per acre.
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre.....	33 2	2,795	53 18	2,680	35 $21\frac{1}{8}$	2,776
2	Barn-yard manure, fresh, 15 tons per acre.....	36 ..	2,778	56 26	4,170	39 $15\frac{3}{8}$	3,010
3	Unmanured.....	26 23	1,497	24 24	1,560	26 $11\frac{3}{8}$	1,507
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	26 26	1,880	27 2	1,700	26 $27\frac{3}{8}$	1,850
5	Mineral phosphate, untreated, finely ground; 500 lbs., nitrate of soda, 200 lbs. per acre.....	39 8	2,629	42 22	3,200	39 $27\frac{3}{8}$	2,724
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using.....	33 18	2,565	39 24	2,720	34 19	2,591
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.....	32 31	3,047	47 12	4,300	35 $10\frac{5}{8}$	3,256
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre.....	32 33	2,445	28 28	2,330	32 $9\frac{3}{8}$	2,426
9	Mineral superphosphate, No. 1, 500 lbs. p. acre.....	27 5	2,115	27 22	1,340	27 $7\frac{3}{8}$	1,986
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.....	32 26	2,877	54 24	2,750	36 $14\frac{1}{2}$	2,856
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	29 30	2,298	33 28	3,440	30 $18\frac{3}{8}$	2,488
12	Unmanured.....	23 ..	1,756	18 28	1,280	22 $10\frac{3}{8}$	1,677
13	Bone, finely ground, 500 lbs. per acre.....	25 32	1,957	30 ..	2,000	26 21	1,964
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	26 17	1,819	33 28	2,230	27 $24\frac{1}{8}$	1,887
15	Nitrate of soda, 200 lbs. per acre.....	34 5	2,304	53 8	3,880	37 $11\frac{1}{8}$	2,567
16	Muriate of potash, 150 lbs. per acre.....	30 ..	2,400	27 2	1,450	29 19	2,242
17	Sulphate of ammonia, 300 lbs. per acre.....	32 5	3,237	45 ..	3,230	34 $9\frac{5}{8}$	3,236
18	Sulphate of iron, 60 lbs. per acre.....	29 30	2,224	27 32	1,790	29 19	2,152
19	Common salt (Sodium chloride) 300 lbs. per acre.....	27 14	2,146	29 4	1,600	27 $23\frac{1}{8}$	2,055
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.....	27 26	2,322	27 22	1,690	27 $25\frac{1}{8}$	2,217
21	Mineral superphosphate, No. 2, 500 lbs. per acre.....	26 1	1,965	26 26	1,650	26 $5\frac{1}{8}$	1,912

CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo and to have the corn so far advanced when cut that the ears shall be in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the dent varieties was tested under No. 1. The Mammoth Southern Sweet was tried in 1888, 1889 and 1890. In 1891 the Red Cob Ensilage was used and in 1892, 1893 and 1894, a free growing flint variety, the Rural Thoroughbred White Flint, was tested. On the other half of the plot (No. 2) the Canada Yellow Flint was used in 1888, 1889 and 1890, the Thoroughbred White Flint in 1891, and Pearce's Prolific in 1892, 1893 and 1894. For the first four years the No. 1 series was planted in drills 3 feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up to 6 or 8 inches apart, and the No. 2 in hills 3 feet apart each way and 4 or 5 kernels in a hill. During the past three years both sorts have been grown in hills. The corn in both series of plots was planted in 1894 on May 23, and cut September 18th. The yield of fodder on these plots during the past season has been considerably below the average.

EXPERIMENTS with Fertilizers, on plots of Indian Corn, $\frac{1}{10}$ th acre each, cut green for Ensilage.

No. of Plot.	Fertilizers applied each year.	AVERAGE YIELD FOR SIX YEARS.		7TH SEASON, 1894.		AVERAGE YIELD FOR SEVEN YEARS.	
		Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.	Plot No. 1— Thoroughbred White Flint, weight of green fodder.	Plot No. 2— Pearce's Pro- lific, weight of green fodder.	Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs
1	Barn-yard manure, well rotted, 12 tons per acre.....	16 34	12 380	14 741	7 1,480	15 1,568	11 1,109
2	Barn-yard manure, fresh, 12 tons per acre.....	19 1,737	11 1,647	11 1,700	5 1,690	18 1,446	10 1,939
3	Unmanured.....	11 187	7 741	3 960	2 850	10 1	6 1,328
4	Mineral phosphate untreated, finely ground, 500 lbs. per acre in 1888—800 lbs. per acre each year since.....	9 1,398	6 270	2 1,030	2 240	8 691	5 1,123
5	Mineral phosphate, untreated, finely ground, 500 lbs. per acre in 1888—800 lbs. per acre, each year since; nitrate of soda, 200 lbs. per acre.....	13 1,050	9 290	4 1,550	4 1,810	12 550	8 1,079
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre; composted together, intimately mixed and allowed to heat for several days before using.....	18 613	12 987	11 1,520	7 1,040	17 743	11 1,566
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.....	16 1,633	10 1,990	11 80	8 210	15 1,983	10 1,164
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	13 828	9 565	8 700	5 1,600	12 1,381	8 1,570
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	12 1,380	9 133	6 980	4 1,780	11 1,609	8 940
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.....	15 1,285	11 623	9 510	6 1,410	14 1,460	10 1,307
11	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	17 848	13 228	13 480	8 950	16 1,510	12 903

EXPERIMENTS with Fertilizers, on plots of Indian Corn, $\frac{1}{10}$ th acre each, &c.—*Continued.*

No. of Plot.	Fertilizers applied each year.	AVERAGE YIELD FOR SIX YEARS.		7TH SEASON, 1894.		AVERAGE YIELD FOR SEVEN YEARS.	
		Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.	Plot No. 1— Thoroughbred White Flint, weight of green fodder.	Plot No. 2— Pearce's Pro- lific, weight of green fodder.	Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs
12	Unmanured.....	12 1,878	10 1,240	6 1,740	4 1,120	12 144	9 1,509
13	Bone, finely ground, 500 lbs. per acre . . .	13 257	9 1,553	6 1,770	5 1,900	12 473	9 460
14	Bone, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.....	13 1,130	9 1,053	9 430	5 1,080	12 1,887	8 1,914
15	Nitrate of soda, 200 lbs. per acre	15 320	11 635	9 590	6 1,690	14 644	10 1,357
16	Sulphate of ammonia, 300 lbs. per acre....	15 428	11 300	10 1,240	7 350	14 1,115	10 1,164
17	Mineral superphosphate No. 1, 600 lbs. ; muriate of potash, 200 lbs. ; sulphate of ammonia, 150 lbs. per acre.....	14 568	9 1,552	9 740	6 1,280	13 1,164	9 656
18	Muriate of potash, 300 lbs. per acre.....	10 1,284	6 1,016	5 760	3 1,520	9 1,781	6 231
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90 ; (muri- ate of potash, 200 lbs., substituted each year since ;) dried blood, 300 lbs. ; miner- al superphosphate No. 1, 500 lbs. per acre.....	12 1,064	8 1,332	6 1,130	4 830	11 1,359	7 856
20	Wood ashes, unleached, 1,900 lbs. per acre	10 1,840	7 608	6 760	5 80	10 1,686	6 1,961
21	Bone, finely ground, 500 lbs. ; sulphate of ammonia, 200 lbs. ; muriate of potash, 200 lbs. per acre	13 928	8 1,773	11 162	7 1,080	13 247	8 1,388

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under so that the plant food they have taken from the soil may be returned to it. One half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips. The preparation of the land has been the same for both these roots. It has been ploughed in the autumn after the crop is gathered, disc-harrowed once in the spring, harrowed with smoothing harrow once, then ridged and sown.

In 1889, the variety of mangel used was the Mammoth Long Red. In 1890, three varieties were sown : 15 rows of Mammoth Long Red, 6 of Mammoth Long Yellow, and 6 of Golden Intermediate on each plot. In 1891, each plot again had three varieties : 18 rows of Mammoth Long Red, 3 of Yellow Fleshed Tankard, and 6 of Golden Tankard. In 1892, 1893 and 1894, one variety only has been used, namely, the Mammoth Long Red. From 4 to 6 lbs. of seed have been sown per acre, each year, in rows $2\frac{1}{2}$ feet apart. In 1894, the mangels were sown May 9, came up May 19, and were pulled October 11.

Two varieties of turnips were sown on the half plots devoted to these roots in 1889 : 25 rows of Carter's Prize Winner, and 2 rows of Carter's Queen of Swedes ; and in 1890, a single variety : Carter's Elephant Swede. In 1891, six varieties were sown : 6 rows of Lord Derby Swede, 4 of New Giant King, 3 of Imperial Swede, 6 of Champion Swede, 4 of Purple Top Swede, and 4 of East Lothian Swede. In 1892, the Improved Purple Top Swede was sown, and in 1893 and 1894, the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, is allowed to stand after disc-harrowing, then cultivated once and ridged immediately before sowing. In 1894, the turnips were sown June 12, came up June 16, and were pulled October 15. The plots of both mangels and turnips have yielded, during the past season, a little better than the average of previous years.

EXPERIMENTS with Fertilizers on Roots ; Plots of Mangels and Turnips $\frac{1}{10}$ acre each.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR FIVE YEARS.		6TH SEASON, 1894. VARIETIES.		AVERAGE YIELD FOR SIX YEARS.	
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	East Half Plot.	West Half Plot.	Mangels, Weight of Roots.	Turnips, Weight of Roots.
		Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.
1	Barn-yard manure, well rotted, 20 tons per acre.....	21 808	11 24	22 1,500	14 420	21 1,257	11 1,090
2	Barn-yard manure, fresh, 20 tons p. ac.	20 1,508	12 1,068	20 1,410	14 100	20 1,492	12 1,573
3	Unmanured.....	9 1,682	7 209	10 1,320	6 1,510	9 1,955	7 92
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre.....	8 1,878	7 1,160	10 320	6 1,870	9 285	7 945
5	Mineral phosphate, untreated, finely ground, 1,000 lbs. ; nitrate of soda, 250 lbs. ; wood ashes, unleached, 1,000 lbs. per acre.....	13 498	7 218	14 1,420	12 920	13 985	8 2
6	Barn-yard manure, partly rotted and actively fermenting, 12 tons per acre ; mineral phosphate, untreated, finely ground, 1,000 lbs. composted together, intimately mixed and allowed to heat for several days before using.....	17 504	10 1,216	20 360	17 350	17 1,480	11 1,405
7	Mineral phosphate, untreated, finely ground, 1,000 lbs. ; sulphate of potash, 200 lbs. in 1889 and 1890, (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years ;) nitrate of soda, 200 lbs. per acre ..	10 987	7 1,617	8 1,350	13 1,940	10 381	8 1,671
8	Mineral superphosphate, No. 1, 500 lbs. ; sulphate of potash, 200 lbs. in 1889 and 1890, (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years ;) nitrate of soda, 200 lbs per acre.....	14 450	10 1,290	18 1,950	14 1,660	15 33	11 685
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	9 1,648	7 1,950	11 470	9 1,020	10 118	8 462
10	Nitrate of soda, 300 lbs. per acre....	13 1,945	7 1,742	16 1,260	10 1,790	14 831	8 750
11	Sulphate of ammonia, 300 lbs. per ac.	9 1,200	8 1,500	16 860	12 1,710	10 1,477	9 868
12	Unmanured.....	7 864	7 462	10 90	6 1,880	7 1,752	7 365
13	Bone, finely ground, 500 lbs. ; wood ashes, unleached, 1,000 lbs. per acre	10 388	7 702	12 190	7 1,270	10 1,022	7 797
14	Wood ashes, unleached, 2,000 lbs. p. ac.	11 1,824	7 1,342	12 240	6 920	11 1,893	7 1,272
15	Common salt (Sodium chloride) 400 lbs. per acre.....	11 836	7 1,750	8 1,870	8 100	11 8	7 1,808
16	Mineral superphosphate, No. 1, 500 lbs. ; nitrate of soda, 200 lbs. per ac.	13 1,977	9 1,540	17 480	12 1,150	14 1,061	10 • 475
17	Mineral superphosphate, No. 1, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.....	12 910	8 1,335	15 1,140	11 1,040	12 1,948	9 286
18	Mineral superphosphate, No. 1, 500 lbs. ; muriate of potash, 200 lbs. p. ac.	13 162	9 1,997	12 580	11 360	12 1,898	10 391
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 ; (muriate of potash, 200 lbs., substituted each year since ;) dried blood, 250 lbs. ; mineral superphosphate, No. 1, 500 lbs. per acre....	14 870	9 857	13 520	12 640	14 478	9 1,821
20	Wood ashes, unleached, 1,500 lbs. ; common salt (Sodium chloride) 300 lbs. per acre.....	15 117	9 1,115	14 1,230	11 1,960	14 1,969	9 1,922
21	Mineral superphosphate, No. 2, 500 lbs. per acre.....	16 910	9 1,397	14 460	11 1,440	16 169	10 71

CARROT PLOTS.

Carrots have been sown on alternate halves of the oat plots for the past four years, for the purpose of cleaning the land from weeds. This work was begun in 1891, and the plots have been sown each year with the variety known as the Improved Short White. In 1894, carrots occupied the west half of the plots. The seed was sown April 24, came up May 7, and the roots were pulled October 18. The crop, this year, is considerably below the average of the three preceding years.

EXPERIMENTS with Fertilizers on half plots (one-twentieth acre) of Carrots (Improved Short White), after Oats.

Fertilizers applied each Year.		Average Yield for three years.	4th Season Improved Short White.	Average Yield for four years.
		Weight of roots per acre.	Weight of roots per acre.	Weight of roots per acre.
		Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre.....	22 1,207	15 460	20 1,520 $\frac{1}{4}$
2	Barn-yard manure, fresh, 15 tons per acre.....	24 17	21 650	23 675 $\frac{1}{4}$
3	Unmanured.....	17 440	13 1,040	16 590
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.	17 190	12 1,840	16 102 $\frac{1}{2}$
5	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. per acre.....	19 1,423	17 810	19 269 $\frac{3}{4}$
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre ; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using	22 1,907	16 1,980	21 925 $\frac{1}{4}$
7	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,000 lbs., per acre.....	16 1,757	16 700	16 1,492 $\frac{3}{4}$
8	Mineral phosphate, untreated, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.	13 640	14 460	13 1,095
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	12 877	9 770	11 850 $\frac{1}{4}$
10	Mineral superphosphate, No. 1, 350 lbs. ; nitrate of soda, 200 lbs. per acre	14 543	14 100	14 432 $\frac{1}{4}$
11	Mineral superphosphate, No. 1, 350 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.....	20 477	14 1,980	18 1,852 $\frac{3}{4}$
12	Unmanured.....	17 1,357	9 1,810	15 1,470 $\frac{1}{4}$
13	Bone, finely ground, 500 lbs. per acre.....	18 440	9 100	15 1,855
14	Bone, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre	21 1,370	15 1,870	20 495
15	Nitrate of soda, 200 lbs. per acre.....	20 397	14 1,940	18 1,783 $\frac{1}{4}$
16	Muriate of potash, 150 lbs. per acre.	19 1,823	18 190	19 914 $\frac{1}{4}$
17	Sulphate of ammonia, 300 lbs. per acre.....	14 1,783	13 340	14 922 $\frac{1}{4}$
18	Sulphate of iron, 60 lbs. per acre.....	15 1,884	14 180	15 958
19	Common salt (Sodium chloride), 300 lbs. per acre.	17 70	18 1,160	17 842 $\frac{1}{2}$
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre..	17 1,700	17 1,820	17 1,730
21	Mineral superphosphate, No. 2, 500 lbs. per acre.	15 340	13 1,210	14 1,557 $\frac{1}{2}$

POTATO PLOTS.

The alternate halves of the wheat and barley plots which were occupied by carrots and sugar beets in 1891, 1892 and 1893, as explained in the annual report for 1893, were planted with potatoes in 1894. These were planted in rows 2 $\frac{1}{2}$ feet apart with the sets one foot apart in the rows.

Those after wheat were planted May 7th came up May 21st and were dug September 20th. On each of these plots there were 20 rows of Lee's Favourite and 7 rows

of Wonder of the World. The accompanying table gives the yield of each variety for each plot and the total yield both in tons and bushels per acre.

Those after barley were planted May 8th came up May 21st and were dug September 22nd. On each of these plots there were 12 rows of Thorburn, 12 rows of Beauty of Hebron, and 3 rows of Early Rose. In the table the yield of each variety for each plot is given, also the total yield both in tons and bushels per acre.

The average yield of the different varieties per row putting the plots all together is as follows, the conditions as far as they can be determined being about equal :—

Beauty of Hebron.....	406½ lbs.
Wonder of the World.....	406¾ do
Thorburn.....	357 do
Lee's Favourite.....	332¾ do
Early Rose.....	235½ do

EXPERIMENTS with Fertilizers on half plots ($\frac{1}{20}$ acre) of Potatoes after Wheat.

No. of Plot.	Fertilizers applied each Year.	WEST HALF OF PLOTS.			
		Yield of 20 rows Lee's Favourite.	Yield of 7 rows Wonder of the World	Total Yield per Acre.	Total Yield per Acre.
		Lbs.	Lbs.	Tons. Lbs.	Bush. Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year since.....	574	220½	7 1 890	264 50
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year since.....	500	203	7 60	234 20
3	Unmanured	299½	124	4 470	141 10
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	378½	123	4 570	142 50
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre	317	133	4 1,000	150
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using..	495	159½	6 1,090	218 10
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.....	324	192	5 320	172
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	306½	161	4 1,350	155 50
9	Mineral superphosphate, No. 1, 500 lbs. per acre.	387	149½	5 730	178 50
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.....	381½	143	5 490	174 50
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	375	151	5 520	175 20
12	Unmanured	229	78½	3 150	102 30
13	Bone finely ground, 500 lbs. per acre.....	207½	120	3 550	109 10
14	Bone finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	334	208	5 840	180 40
15	Nitrate of soda, 200 lbs. per acre.....	386	136	5 440	174
16	Muriate of potash, 150 lbs. per acre	292	147	4 780	146 20
17	Sulphate of ammonia, 300 lbs. per acre.....	183	113½	2 1,930	98 50
18	Sulphate of iron, 60 lbs. per acre.....	181	88	2 1,380	89 40
19	Common salt (Sodium chloride) 300 lbs. per acre.	144	48½	1 1,850	64 10
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.....	192	63	2 1,100	85
21	Unmanured in 1889, mineral superphosphate, No. 2, 500 lbs. per acre each year since.....	233	82	3 300	105

EXPERIMENTS with Fertilizers on Half-Plots, $\frac{1}{20}$ acre of Potatoes after Barley.

No. of Plot.	Fertilizers applied each Year.	EAST HALF OF PLOTS.					
		Yield of 12 rows Thor- burn.	Yield of 12 rows Beauty of He- bron.	Yield of 3 rows Early Rose.	Total yield per acre.		Total yield per acre.
		Lbs.	Lbs.	Lbs.	Tons. Lbs.	Bush. Lbs.	
1	Barn-yard manure well rotted, 15 tons per acre.	342	325	75	7 840	247	20
2	Barn-yard manure, fresh, 15 tons per acre.....	375	352	70	7 1,940	265	40
3	Unmanured.....	160	190 $\frac{1}{2}$	21	3 1,430	123	50
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	155	197	32 $\frac{1}{2}$	3 1,690	128	10
5	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. per acre..	125	169 $\frac{1}{2}$	19 $\frac{1}{2}$	3 280	104	40
6	Barn-yard manure partly rotted, and actively fermenting, 6 tons per acre; mineral phos- phate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using.....	232	260 $\frac{1}{2}$	48	5 810	180	10
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.	175	261 $\frac{1}{2}$	33	4 1,390	156	30
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes unleached, 1,500 lbs. per acre.....	225	239	23 $\frac{1}{2}$	4 1,750	162	30
9	Mineral superphosphate No. 1, 500 lbs. per acre	250 $\frac{1}{2}$	290	51	5 1,830	197	10
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	227	251	40 $\frac{1}{2}$	5 370	172	50
11	Mineral superphosphate No. 1, 350 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,500 lbs. per acre	313	337	48	6 1,960	232	40
12	Unmanured.....	178	161	16 $\frac{1}{2}$	3 1,110	118	30
13	Bone, finely ground, 500 lbs. per acre.....	137	137	19 $\frac{1}{2}$	2 1,870	97	50
14	Bone, finely ground, 500 lbs.; wood ashes, un- leached, 1,500 lbs. per acre.....	230	240 $\frac{1}{2}$	45 $\frac{1}{2}$	5 320	172	
15	Nitrate of soda, 200 lbs. per acre	139	176	29	3 880	114	40
16	Muriate of potash, 150 lbs. per acre.	152	247	26	4 500	141	40
17	Sulphate of ammonia, 300 lbs. per acre.....	134 $\frac{1}{2}$	129	16	2 1,590	93	10
18	Sulphate of iron, 60 lbs. per acre.....	134	149	10	2 1,860	97	40
19	Common salt (Sodium chloride) 300 lbs. per acre	162 $\frac{1}{2}$	275 $\frac{1}{2}$	30	4 1,360	156	
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre	232	250	31 $\frac{1}{2}$	5 270	171	10
21	Mineral superphosphate No. 2, 500 lbs. per acre	206	238 $\frac{1}{2}$	21	4 1,310	155	10

COMPARISON OF RESULTS FROM THE USE OF EQUAL QUANTITIES OF BARN-YARD MANURE,
FRESH AND WELL ROTTED.

On examination these tables of results all show that the best returns are obtained in growing all of the crops referred to from the use of barn-yard manure, and that in a large proportion of cases the yields are in favour of the fresh manure as compared with that well rotted when used in equal weights. The following table summarizes the relative advantage in yield on both sides during the whole course of these experiments :—

				In favour of well rotted Manure, 15 tons per ac.		In favour of Fresh Manure, 15 tons per ac.	
				Bush.	Lbs.	Bush.	Lbs.
Wheat, average yield per acre for 7 years							8½
Barley	do	6	do			1	40½
Oats	do	6	do			3	28
				Tons.	Lbs.	Tons.	Lbs.
Corn (Plots 1)	do	7	do			2	1,878
do (Plots 2)	do	7	do		1,170		
Mangels	do	6	do		1,765		
Turnips	do	6	do			1	483
Carrots after oats	do	4	do			2	1,155
do wheat	do	3	do			1	810
do barley	do	2	do		1,205		
Sugar beets after barley, average yield per acre for 1 year				1	270		
Potatoes after wheat	do		1 do		1,830		
do barley	do		1 do				1,100

These results seem to show that fresh barn-yard manure gives on the average greater fertility to the soil than an equal weight of manure well rotted. This subject is a most important one in the economy of manures, since during the process of thorough rotting, barn-yard manure loses about 40 per cent of its weight, to which must be added the cost of twice handling and that of turning once or twice during the process of fermentation. As stated in the report for 1893, the reason why the fresh manure is equal to the rotted, weight for weight, probably lies in the fact that the liquid portions of the manure, the richest in nitrogen have much of this most valuable constituent volatilized and lost during the process of rotting.

SAMPLE HEDGES ON THE CENTRAL EXPERIMENTAL FARM.

In the annual report of the Experimental Farms for 1889 a brief reference was made to ten varieties of trees and shrubs, the suitability of which for hedge purposes was being tested. The many inquiries which have since been made regarding shrubs and trees suitable for hedges from all parts of the Dominion, has led to an extension of this work not only at the central farm but also at the branch farms. These latter will be reported on hereafter. The trial hedges at the central farm now number forty-six in all, ten of which were planted in 1889, fourteen in 1890, nine in 1891, and thirteen in 1894. In planting these hedges the young shrubs or trees have all been put in in single rows and at a uniform distance of fifteen inches apart. These hedges have been planted in sections of fifty feet in length and ten feet apart arranged in a tier covering nearly 500 feet. The object lesson given by this comparative test has interested a large number of the visitors to the farm, and many hedges have been planted on private grounds as a result of the information gained here. These hedges are usually pruned twice a year, the first time in June and the second sometime in August, depending on the season and the growth the hedges have made. None of them have yet

developed sufficient strength to serve the purpose of inclosure of land against cattle without fencing, but many of them are very ornamental and would serve an admirable purpose as dividing lines between neighbours in towns and cities where strong fences are not required or for separating a lawn from the fruit or kitchen garden.

HINTS ON HEDGE PLANTING.

In planting hedges the young shrubs or trees of deciduous species should not be more than one and a half to two feet high, and at the time of planting should be cut back to six or eight inches above ground to encourage a thick growth at the bottom, a single row fifteen inches apart is all that is necessary in any case. When planting evergreen hedges, young bushy trees from twelve to eighteen inches high should be chosen, and these will need but little trimming when planted, just sufficient to make the plants even in height and width. If evergreens are cut severely back so as to deprive them of much of their foliage they are unable readily to replace such loss and are liable to suffer permanent injury from such treatment. When planting a hedge it should have a space of at least two feet on either side of it clear of grass, and this land should be kept free from weeds and hoed occasionally during the summer; as the hedge grows, this space will need widening. The after trimming will necessarily vary in degree depending on the annual growth made, and the taste of the grower. Many of the species to be referred to can be easily propagated from cuttings. Such cuttings should be made late in the autumn unless otherwise directed, after the leaves have fallen; they should be from six to eight inches long; the lower end should be cut off smoothly just below the bud, the upper end just above the bud. When the cuttings are planted they should be put out in rows from one to two feet apart and about six inches apart in the rows and buried so that the upper bud shall be just above the ground. They may be planted in beds as soon as they are cut or they may be tied in small bundles and buried in the garden a foot or so below the surface and the earth mounded up over them, or buried in moist sand in a cellar and planted very early in the spring. During the winter there forms on the ends of the cuttings a granular growth called a "callous," from which young roots start in the spring. Well established plants suitable for hedge planting may usually be grown in a single season from such cuttings if they are well cared for and in most cases no special skill is required to secure successful results. The method of propagation of each species will be given with other particulars under their special headings in the following list.

LIST OF TREES AND SHRUBS TESTED FOR HEDGES.

1. Siberian Pea Tree. *Caragana arborescens*.—This hedge was planted in 1889. Its present height is 4 feet 6 inches, width near base 3 feet, it has made good growth and forms a compact and very pretty hedge. The foliage is neat, and early in the summer it is covered with small bright yellow pea-shaped flowers. It is a native of Siberia, is very hardy and has succeeded well on all the experimental farms, including the farms at Brandon, Man., and Indian Head, N.W.T., and promises to be one of the most useful bushes in cultivation for general hedge purposes. The Siberian pea tree is easily grown from seed, which may be sown when fully ripe in the autumn or early in the spring.

2. American or White Elm. *Ulmus Americana*.—Planted in 1889, present height 5 feet 4 inches, width near base 3 feet 6 inches. Beginning with young trees about two feet high and cut back, followed by regular training, this makes a compact, hardy and useful hedge. On account of its tendency to make strong growth, it requires more attention than some others. Raised from seed. Young seedlings of this tree of suitable size, may be found in many localities in the woods.

3. Russian Mulberry. *Morus Tatarica*.—Planted in 1889, present height 5 feet 6 inches, width near base 5 feet. This hedge is very handsome and compact and has grown more both in height and width than most of the others. It is easily kept in order, but is not entirely hardy, the tips of the branches are winter-killed more or less

every year, but not enough to disfigure the hedge. This may be grown either from seed or cuttings.

4. Norway Spruce. *Picea excelsa*.—This hedge was planted in 1889, with young trees from 15 to 18 inches high, it now averages 4 feet 6 inches in height, with a width near its base equal to its height. It is very compact and handsome, forming a solid mass of green all through the year. This tree is grown from seed, but is of slow growth, young trees requiring 3 to 4 years to attain a height of 15 to 18 inches. Suitable young trees of this species can usually be obtained from nurserymen at reasonable prices.

5. Honey Locust. *Gleditschia triacanthos*.—Planted in 1889, height 4 feet 3 inches, width near base 4 feet. This tree has a beautiful fern-like foliage, but it is too tender for hedges for the Ottawa district. Trees planted singly are occasionally found to be quite hardy, but in hedges they kill out more or less, making the hedge irregular and unsightly. This tree is also a very strong grower and hence requires more frequent clipping to keep it in shape than most others, which makes it less desirable for this purpose. It is quite hardy in Western Ontario, where it is being used in some localities to a considerable extent for farm hedges. Its rapid growth makes it very unsuitable for this purpose, as the cost of labour required to keep a hedge of honey locust in good shape would be much more than the price of ordinary fencing, and if neglected each specimen struggles to become a tree, the more vigorous rapidly outgrow and smother the weaker ones, and the plantation soon becomes unsightly.

6. White Spruce. *Picea alba*.—This native evergreen makes one of the most desirable of all evergreen hedges. Planted in 1889, present height 3 feet 3 inches, width near base 3 feet 3 inches. This hedge is very compact and handsome, is not quite so rapid in growth as the Norway spruce, but is more dense in its compactness and makes a wall of constant greenness, and requires less clipping to keep it in order. In form it is beautifully regular. In many localities young trees may be found in abundance in the woods. If these are used, they should not be more than 12 to 18 inches high when transplanted, and would be better if put into nursery rows in garden soil for a year, removing at the end of that time into hedge row those specimens which have become established, and are fairly even in height and bushiness. The young trees may also be raised from seed, but like the Norway spruce, they make slow growth; they may be bought ready for planting from the nurseryman.

7. Common Barberry. *Berberis vulgaris*. Planted in 1889, present height 4 feet 3 inches, width near base 4 feet. The common barberry makes a thrifty hedge, of a compact and regular form, and from its habit of sending up new shoots every year from the base it becomes after a time so thick as to be almost impenetrable, the foliage is dark green, the leaves small, nearly round and finely serrated. The flowers are small, greenish yellow and in long clusters, and later in the season the bright scarlet berries add to the attractiveness of this hedge. The barberry is easily grown from seed.

8. Hemlock Spruce. *Tsuga Canadensis*. Planted in 1889, height 2 feet 6 inches, width near base 2 feet. This beautiful native evergreen succeeds best in positions somewhat sheltered and rarely does well for any considerable time in a hedge. It does not grow thriftily and branches occasionally die, giving the hedge an irregular appearance. On this account it cannot be recommended for hedge purposes in the Ottawa district.

9. Purple Barberry. *Berberis vulgaris purpurea*.—Planted in 1889, height 4 feet, width near base 3 feet, 6 inches. This is a purple-leaved variety of the common barberry referred to under No. 7. The purple-leaved variety is scarcely so strong a grower as the common green form, but it seems to be equally hardy and it makes in every way as good a hedge, and has the advantage of a rich purple hue which forms a pleasing contrast with other trees and shrubs. As this bush does not always come true to colour when grown from seed, it may be multiplied by suckers or layers, or it may be grown from well ripened cuttings.

10. Prickly Ash. *Zanthoxylum Americanum*.—Planted in 1889, height 3 feet 6 inches, width near base 3 feet. The prickly ash makes a fairly compact and prickly

hedge with a neat and pretty foliage, but its tendency to sucker is an objection to its use for hedge purposes.

11. Japan Rose. *Rosa Rugosa*.—Planted in 1890, height 3 feet 6 inches, width near base 4 feet. This bush makes a fairly compact hedge and grows rapidly, the foliage is larger than that of most roses, and the leaves are thick and glossy, and are seldom injured by insects. When in bloom its large deep rose coloured flowers are handsome and fragrant. The flowers are succeeded by clusters of very large bright red fruit attractive throughout the winter. The tendency of this shrub is towards a spreading growth, and a hedge of it needs more frequent clipping than some others. Its tendency to sucker is also against it. It may be propagated by seed and by suckers.

12. Golden-leaved Spiræa. *Spiræa opulifolia aurea*.—Planted in 1890, height 5 feet, width near base 5 feet. This is one of the handsomest hedges in the group, thrifty and compact in form, a rapid grower and is perfectly hardy. When the foliage expands in the spring it is of a brilliant golden hue, and it retains more or less of this colour until near the end of the season. This hedge contrasts finely with adjacent hedges with green and purple foliage, and is a striking object on account of its unusual colour during the greater part of summer.

13. Red-leaved Rose. *Rosa rubrifolia*.—Planted in 1890, height 4 feet, width near base, 3 feet 6 inches. This makes a pretty hedge, its small, neat foliage retaining a decided purplish red colour until the autumn. It is almost free from thorns and bears clusters of single pinkish, rose coloured flowers, followed by bunches of large scarlet fruit which remain on the bushes all winter. It does not, however, form a compact hedge, but is thin towards the base, and hence is not so desirable as some others. This is easily grown from seeds and most of the seedlings come true to colour.

14. Arbor Vitæ. *Thuja occidentalis*.—Planted in 1890, height 3 feet, width near base 3 feet. This valuable native tree makes a first class evergreen hedge, one of the best. It is compact, neat, of a rich green throughout the summer, assuming a duller shade during the winter months. It is very hardy, and does not require much care or trimming, although it bears cutting well. In addition to the hedge of 50 feet there is more than a mile of this hedge on the Central Experimental Farm, forming a boundary line on each side of one of the main roads passing through the farm. Arbor vitæ hedges have also been planted in several other places as a margin for inclosures adjacent to the buildings. These hedges are all good specimens, they have made regular and even growth, and are much admired by visitors. In many parts of Canada young trees of this species can be obtained from the woods, they should be transplanted when not more than 12 to 18 inches high into nursery rows and grown for a season, when the most thrifty plants should be selected to form the hedge, and when planted they should be trimmed so as to be even in height. Young and well rooted plants can also be obtained from the nurseries.

15. Baker's Rose. *Rosa Bakeriana*, planted in 1890, height, 2 feet 3 inches width near base 2 feet. This is a European wild rose which is tender in this climate, it kills back badly every year and is of no value here for any purpose.

16. Lilac. Seedlings of *Syringa vulgaris alba*.—Planted in 1890, height 4 feet 3 inches, width near base 3 feet 6 inches. The shrubs which form this hedge were raised from seed of the White Lilac, procured in Germany. They were from 12 to 18 inches high when planted, have grown well and have made a compact and shapely hedge, no flowers have yet been produced. The foliage is large, glossy and handsome, and the hedge is very attractive.

17. Sweet Briar. *Rosa rubiginosa*.—Planted in 1890, average height 3 feet 6 inches, width near base 3 feet, but very irregular. This bush has a straggling habit in growth, it also lacks hardiness and is of no value for hedge purposes in Ottawa.

18. Thunberg's Barberry. *Berberis Thunbergii*.—Planted in 1890, height 2 feet 4 inches, width at base 3 feet. This is a recently introduced species from Japan brought over in 1883. It makes one of the prettiest hedges in cultivation where a low growing hedge is desired. It is neat, very compact and regular in growth, is very hardy and retains its foliage during summer nearly to the ground. It bears clusters of flowers in the spring of a greenish straw colour tinged with red, which are followed by brilliant

scarlet berries. In the autumn the leaves turn to a fiery red and the bush then becomes one of the most striking objects to be found. After the leaves fall the scarlet berries hang as ornaments on the bare branches during the winter. This valuable bush is easily grown from seed.

19. White Pine. *Pinus Strobus*.—Planted in 1890, height 3 feet 3 inches, width near base 3 feet. This tree makes a handsome and useful evergreen hedge as it is hardy and maintains most of its lively green colour throughout the winter when many other evergreens look dull. The young trees grew irregularly for a year or two, but are now making a symmetrical and compact hedge, which does not require much clipping and appears to bear cutting well. Young white pine trees may be found in the woods in many parts of Canada when they may be transplanted and cared for as directed under arbor vitæ (No. 14), or they may be purchased from the nurseries.

20. Snowberry. *Symphoricarpus racemosus*.—Planted in 1890, height 3 ft. 3 in., width 3 ft. 3 in. This makes a rather weak growing and straggling hedge, the wood of which usually kills back at the tips here in winter; it also has a habit of suckering which is objectionable. Is not desirable in the east where much better hedges can be grown, but on the experimental farm for the North-west Territories at Indian Head, where this shrub and an allied species *S. occidentalis* grows wild, it has been found to make a useful hedge for garden purposes.

21. Pliant Viburnum. *Viburnum lantana*.—Planted in 1890, height 3 ft. 3 in., width near base 3 ft. This bush has large, handsome and deeply veined foliage, bears clusters of white flowers in the spring followed by bright red berries which become dark purple later in the season. It grows wild in Great Britain and has proven very hardy in this country. It makes a compact and desirable hedge. This bush is easily raised from seed, which should be sown in the autumn soon after it ripens, when it will usually germinate the following season. If the seeds are kept over and sown in the spring, germination is often delayed until the following year.

22. Chinese Lilac. *Syringa chinensis (rothamagensis)*.—Planted in 1890, height 2 ft. 9 in., width near base 2 ft. 9 in. This lilac makes a fair hedge but is too loose and open in its growth to entitle it to a place among the best. The foliage is relatively small and the clusters of violet bloom add to the appearance of the hedge during the flowering season. This variety was introduced from China in 1795, it may be increased by suckers which are produced freely.

23. Breaking Buckthorn. *Rhamnus frangula*. Planted in 1890, height 4 ft. 3 in., width near base 4 ft. 9 in. This shrub is a native of Britain but is quite hardy here and makes a thrifty strong growing compact hedge which deserves a place in the front rank. The leaves are small and the flowers which are borne in the axils of the leaves are very small and of a greenish white colour. Later in the season they are succeeded by round black berries about a quarter of an inch in diameter. This buckthorn is easily grown from seed.

24. Cockspur Thorn. *Crataegus crus galli*. Planted in 1890, height 3 ft. 9 in., width near base 3 ft. This thorn, which is a native of Ontario, makes a compact and useful hedge, the branches being armed with long stout thorns. It is not a rapid grower but the growth is even and regular. No bloom has yet appeared on this hedge. Thorns are usually grown from seeds which generally lie in the ground over a season before sprouting.

25. Box Elder. *Negundo aceroides*. Planted in 1891, height 3 ft. 8 in., width near base 3 ft. 6 in. This native tree has been found very useful for hedge purposes in Manitoba and the North-west Territories, where such inclosures are desired more especially to break the force of winds. This tree in hedge grows rapidly and on this account requires more frequent clipping than some others and needs to be kept well cut back if the growth of the side shoots is to be satisfactorily maintained. It is too rank a grower here to make a neat hedge.

26. Van Houtte's Spiræa. *Spiræa Van Houttei*.—Planted in 1891; height, 3 feet; width near base, 2 ft. 6 in. This spiræa has too slender and weak a growth to make a useful and compact hedge, but it is very beautiful when in bloom as it is then almost covered with white flowers from top to bottom for about a fortnight. This shrub is

more valuable as single specimens in the shrubbery or on the lawn than for hedge purposes. It is easily propagated by cuttings.

27. Swedish Juniper. *Juniperus communis fastigiata*.—Planted in 1891 ; height, 2 ft. 9 in. ; width near base, 2 ft. The Swedish juniper has made a very neat and fairly compact evergreen hedge, and appears to be quite hardy. It does not make a strong growth, but it thickens up well, and twice trimming during the year keeps it in good shape. Young trees of this juniper can be had from most of the larger nurseries.

28. Nettle tree. *Celtis occidentalis*.—Planted in 1891 ; height, 2 ft. 9 in. ; width near base, 3 ft. 6 in. This hardy native tree has made a low, bushy and very compact hedge. The young trees were small when put out and the hedge has not grown as rapidly as was expected from the natural habit of the tree. The growth, however, has been rigid, firm and even, and the hedge is compact and shapely. The lack of symmetry in the leaves at the base gives an interesting character to this hedge. The nettle tree is usually propagated by seeds and is also said to grow from cuttings of well ripened shoots planted in the autumn.

29. Rocky Mountain Blue Spruce. *Picea pungens*.—Planted in 1891 ; height, 2 ft. 6 in. ; width near base, 2 ft. This is one of the most desirable evergreens of recent introduction. It is found native in the vicinity and on the slopes of the Rocky Mountains, and when grown from seed collected from trees found at the higher limits of its growth, it is quite hardy here. Its habit is somewhat stiff, but it is richly clothed with foliage which varies in tint in different specimens from a rich deep green to a pale steely blue. This hedge was planted with young plants selected for their blue colour, but during their subsequent growth some have become decidedly blue, some slightly blue, while others have put on different tints of green. This blending of colour gives the hedge a unique and most attractive character. The hedge is stately in form, very compact, and bears clipping well. Young specimens of this evergreen can be obtained from many of the larger nurseries.

30. Josika's Lilac. *Syringa Josikea*.—Planted in 1891 ; height 3 ft. 6 in. ; width near base, 3 ft. Of the several lilacs yet tried this seems to be the most promising for hedge purposes. It is a native of Hungary and has a stiff and stately habit which becomes intensified in a regularly clipped hedge and the large foliage with which it is clothed, while thick, leathery and deep in colour, has a polished surface and laurel-like appearance which is very attractive. It blooms later than the ordinary lilac and makes a very compact and useful hedge and is quite hardy. May be propagated from suckers.

Most of the remaining sixteen hedges have been more recently planted and have not made sufficient growth to permit of an opinion yet being formed of their respective merits. They will be reported on hereafter. The following is a list of the names of the trees and shrubs of which these hedges are composed :—

Evergreen.

Douglas Spruce.—*Pseudotsuga Douglasii*.

Swiss Stone Pine.—*Pinus cembra*.

Douglas' Golden Arbor-vitæ.—*Thuya occidentalis aurea*.

Ginnalian Maple.—*Acer Ginnala*.

Russian Olive.—*Eleagnus angustifolia*.

High Bush Cranberry.—*Viburnum opulus*.

Round Leaved Spiræa.—*Spiræa media rotundifolia*.

Double flowering Mock Orange, or Syringa.—*Philadelphus coronarius primulæ-florus*.

Golden Leaved Mock Orange, or Syringa.—*Philadelphus coronarius aurea*.

Douglas' Spiræa.—*Spiræa Douglasii*.

Amur Privet.—*Ligustrum amurense*.

Maule's Pyrus.—*Pyrus Maulei*.

Wild Plum.—*Prunus Americana*.

Crenate Deutzia.—*Deutzia crenata*.

Headed Cytisus.—*Cytisus capritatus*.

Elongate Cytisus.—*Cytisus elongatus*.

A CHOICE COLLECTION OF HARDY ORNAMENTAL SHRUBS.

The inquiry is frequently made both by visitors and correspondents, who have but a limited garden space, what are the best and most attractive shrubs for such limited areas. As a partial reply to this question a selection of 12 varieties will be briefly described, each one of which, by its grace of form, its attractive foliage, or beauty of flower, or all combined, will afford much gratification to its possessor. The list is so small that many choice things are unavoidably omitted and no attempt will be made to include in this small number any of the very beautiful evergreens so desirable in every collection. These may be dealt with on a future occasion. Several of the most desirable of the shrubs in this select list have already been mentioned under ornamental hedges, but they are well deserving of special commendation also for the garden or lawn. The illustrations used have been engraved from photographs of specimens growing on the Central Experimental Farm.

1. Lilac Chas. X. *Syringa vulgaris* Chas. X.—Lilacs are among the best known and most beautiful of the spring flowering shrubs and are universally admired. They are easily grown and flower freely. Some varieties, however, produce flowers in much greater abundance than others. There are about ten species in all of this genus, and of some of these there are many varieties, but none have produced, under cultivation, forms giving so great a variety of character of bush and colour of flower as the common lilac, *Syringa vulgaris*, and it is one of the most beautiful of these forms known as Chas. X., which will first claim our attention. Fig. 3 is from a photograph taken in June, 1894, of a specimen



FIG. 3.—LILAC CHAS. X.

about 4 feet high on one of the lawns. This variety is rather dwarf in habit and slow in growth, probably because there is a great tax annually on its powers in the profuse production of bloom with which it is covered. No other lilac in the large collection now brought together on the experimental farms blooms so profusely as Chas. X., and the bush is perfectly hardy. The flowers are of a deep purplish lilac, fragrant and borne on large trusses.

2. Woody Caragana. *Caragana frutescens*.—This is one of a family of most useful and desirable shrubs the most familiar member of which is the Siberian pea tree, *Caragana arborescens*, which is referred to under ornamental hedges (No. 1). *Caragana frutescens* is also a native of Siberia, but is a less rapid grower and rarely grows higher than 3 to 4 feet, while the Siberian pea tree attains, under favourable conditions, in a few years a height of 10 to 12 feet or more. *C. frutescens* also produces flowers more abundantly and the individual flowers are larger. It is a most attractive object when in bloom as the whole bush is thickly covered with bright yellow pea shaped flowers. The flowers open early in the season and are succeeded by small green seed pods which, when approaching ripeness, change to a dull reddish colour and when fully ripe they burst and the seeds are scattered. This desirable shrub is easily raised from seed which may be sown in the autumn as soon as fully ripe, or early in the spring.

3. Large Flowered Variegated Weigelia *Diervilla grandiflora variegata*.—The cultivated weigelias which are now referred by botanists to the genus *Diervilla* are among the most beautiful flowering shrubs in cultivation. The large flowered weigelia is a native of Japan—a country which has given us in recent times many beautiful shrubs and flowers. The foliage on the ordinary form of this shrub is green, but in the variegated form, to which reference is here specially made, the leaves are beautifully margined with white which makes it a most attractive object on the lawn at all seasons of the year. When in bloom the flowers are so profuse that much of the foliage is hidden. The flowers are white shaded with rose and are funnel shaped at the base, they are produced in axillary and terminal clusters. Fig. 4 shows one of these shrubs



FIG. 4.—VARIEGATED WEIGELIA.

in bloom, a specimen in the arboretum at the Experimental Farm. Most of the weigelias are tender in this climate, and the branches are killed back every winter, half way or more to the ground. This winter killing may be partially prevented by protecting these shrubs during the winter with a wrapping of straw or evergreen branches. The variegated form has been hardier with us than any of the others and has never been protected. From the figure it will be seen that this bush flowered well in 1894, nearly to the tips. It is easily propagated from cuttings.

4. Van Houtte's Spiræa. *Spiræa Van Houttei*.—This charming spiræa is a fitting companion to the weigelia just referred to on account of the abundance of bloom

which it produces. The spiræas form a very large group of interesting and attractive shrubs, representatives of which are found native in almost every part of the world. None, however, are more beautiful when in flower than Van Houtte, which is then literally a sheet of pure white bloom. This bush has already been referred to under ornamental hedges (No. 26), but it is more useful when grown as an individual shrub. Fig. 5 represents a specimen in full bloom on one of the lawns on the Experimental Farm.



FIG. 5.—VAN HOUTTE'S SPIRÆA.

This bush is about 4 feet high and a little more than 4 feet across. It has a graceful and partly pendulous habit, as a rule it is hardy here, but in severe winters the branches are sometimes injured at the tips. It is quite hardy in Western Ontario; the usual method of propagation is from cuttings.

5. Thunberg's Barberry. *Berberis Thunbergii*.—This beautiful barberry, which has already been referred to under No. 28 in the chapter on hedges as one of the most charming shrubs for that purpose, is even more attractive when grown as a single specimen. Then it has an opportunity of displaying its beauty of form which is neat and graceful. The flowers are produced early in the season, but they are not conspicuous and are partly hidden under the branches. Later, the scarlet berries are quite ornamental and the brilliant scarlet colour assumed by the leaves of this bush towards the close of the season makes it then a most conspicuous and attractive object.

6. Red Tartarian Honeysuckle. *Lonicera tatarica*.—This is a very hardy and useful shrub, a native of Tartary, which has long been a favourite among lovers of shrubs and trees. The flowers open early in the spring. They are rose coloured and so abundant as to partly hide the foliage. Fig. 6 shows one of these shrubs in bloom, a specimen in one of the flower borders on the farm. They remain in flower for two or three weeks, and after the flowers are gone they are succeeded by dark coloured berries which are quite ornamental. In growth the bush has a rounded form and graceful habit. There are a number of species in this group brought from different parts of the world some of which have yellow flowers, others white, red or variegated. A group of the different species and varieties planted together such as may be seen in the Arboretum at

the Experimental Farm is most charming in the pleasing contrasts of flower and foliage which they display.

7. Golden Leaved Spiræa. *Spiræa opulifolia aurea*.—This attractive spiræa has also been referred to under hedges (No. 12) as one of the most desirable shrubs for this



FIG. 6.—RED TARTARIAN HONEYSUCKLE.

purpose. It is equally useful on the lawn and in the shrubbery : although not specially attractive in flower its clusters of seed vessels are pretty and its golden foliage contrasts so beautifully with the deep green of a well kept lawn or the varying tints of green and purple in the shrubbery that it has become quite a favourite. The golden leaved spiræa is a strong grower, soon attaining a height of 5 or 6 feet, is more or less rounded in form and rather stiff in habit ; the foliage also is larger than that of most of the spiræas. It is very hardy and may be easily grown from cuttings.

8. Guelder Rose or Snowball. *Viburnum opulus sterilis*.—This is an old favourite in gardens, too well known to need much description. It forms a very handsome shrub with large foliage, and is a sterile form of the high bush cranberry, *Viburnum opulus*, in which all the flowers are sterile and fully developed, forming large nearly globular clusters, of a pure white colour which remain on the bush a considerable time before fading. Fig. 7 represents a bush in one of the groups on the Experimental Farm. This species may be propagated by layering or by cuttings of the half ripened shoots made during the summer and inserted in sandy soil in a somewhat shady position.

9. The Pliant Viburnum. *Viburnum lantana*.—There are several handsome species among the Viburnums besides the snowball, and one especially, the pliant viburnum which commends itself for several reasons. This bush has already been spoken of favourably under hedges (No. 21). Grown as an individual specimen it makes a fine shapely bush, erect in habit with beautiful foliage, and produces large flat cymes of white flowers early in the season, which are succeeded by clusters of berries which at first are

bright red and when ripe nearly black. It is very hardy and may be propagated by layers or cuttings as directed for the snowball, or it may be grown from seed.



FIG. 7.—GUELDER ROSE OR SNOWBALL.

10. White Japan Rose. *Rosa rugosa alba*.—The red flowering form of *Rosa rugosa* has already been referred to when treating of hedges under No. 11. This is the same



FIG. 8.—WHITE JAPAN ROSE.

species with white flowers. It is a vigorous grower and makes a shapely rounded bush about 4 feet high, as seen in figure 8, which represents a specimen in the Arboretum

at the Experimental Farm. Both the red and white varieties bloom freely and remain in flower for a considerable period, and both may be propagated by suckers which are freely produced when the bushes are well established.

11. Large flowered Mock Orange (*Philadelphus grandiflora*.) Our collection would be very incomplete without an example of the Mock Orange or Syringa. There are several species belonging to this genus, which are very beautiful and interesting, especially when in bloom. *Grandiflora* is one of the best of them. The flowers are large, pure white, and sweet scented, and are produced in great abundance during the month of June. The bush is a vigorous grower; and if not interfered with will, under favourable conditions, eventually reach a height of 8 or 10 feet. Since the flowers are produced only on the wood of the previous year, this may be cut away when the flowering period is over, which will give more room to the new shoots, and they will become better ripened. In this way these shrubs may be kept smaller and made to produce flowers in greater profusion. The Syringas will, however, do very well without any pruning beyond the occasional removal of dead wood, and flower freely. The large flowered species is fairly hardy and usually comes through the winter without much injury, especially where partially protected by other trees and shrubs, but in seasons of unusual severity the shoots are often partly winter killed.

12. Large flowered Hydrangea. *Hydrangea paniculata grandiflora*. Although placed last, because it is later in flowering, the merits of this hydrangea would fairly entitle it to be put among the first and best of flowering shrubs. It was introduced from Japan in 1874, and during the twenty years which have since elapsed, it has become one of the most widely diffused and favourite shrubs in cultivation. It succeeds well under many different climatic conditions, and will grow in almost any soil which is fairly rich, provided it be well supplied with water. Fig. 9 represents a specimen in



FIG. 9.—LARGE FLOWERED HYDRANGEA.

one of the flower borders at the farm, and shows the profuse flowering habit of this shrub. The clusters of bloom are very large, sometimes nearly a foot long and 8 to 10 inches wide, and are borne at the ends of the branches. After fully expanding, the flowers, which are white, remain in good condition for about a fortnight, after which they begin to assume a pinkish hue and gradually become soiled with dust and by in-

sects, and eventually wither. During the early autumn when this bush is in the height of its glory, there are very few other shrubs in bloom. This gives the greater prominence to this showy and valuable shrub which would however hold its place well in any company. This hydrangea is quite hardy in the Ottawa district, and may be propagated by cuttings made from the partly ripened wood during the summer months.

FOREST AND ORNAMENTAL TREES AND SHRUBS.

During the year 1894, the forest belts and clumps, which were planned when the work began on the central experimental farm, have been completed by the planting of 3,442 trees along the northern boundary of the farm. Particulars of this work will be found in the appended report of the Foreman of Forestry, Mr. W. T. Macoun. In this report it is shown that there are now growing on the experimental farm in the various permanent plantations, avenues, hedges and groups in the shrubbery borders, a total of 35,735 trees and shrubs. To this number may be added 1,407 specimens, which have been planted in the Arboretum under charge of the botanist, making a total of 37,142 trees and shrubs, all of which have been planted since the improvements began on the experimental farm in 1887. In this mass of material, there will be found plantations of various sizes of all the valuable economic woods which can be grown in this country for timber or for fuel from which useful data will in future, from time to time, be obtained as to the annual growth of the individual trees and the quantity of wood growth per acre. There are also now in the entire collection more than 700 varieties of trees and shrubs under test as to their hardiness and adaptability to the climate of the Ottawa district. In this number, there are included species and varieties from every part of the world where the climate is such as to give a reasonable probability of success in their growth. It is expected that many additional varieties will be added during the coming season.

The forest tree department, including the ornamental trees and shrubs, has from the outset been under the special charge of the Director. No sufficient provision having been made otherwise for the work, it was at first more convenient that the material annually distributed by this branch should be put up and mailed by the horticultural division, and this plan was temporarily adopted. I beg to acknowledge my indebtedness to the horticulturist, Mr. John Craig, for the efficient and willing service he has rendered me in this important work, which has required on his part a considerable amount of labour and oversight. Under Mr. Craig's supervision, there were sent out through the mail in 1890, 1,000 packages containing 100,000 young forest trees, each variety labelled, and with each package a circular giving instructions for their planting and care. In 1891, 2,000 packages were mailed containing 200,000 young forest trees; there were also sent out that year 3,782 bags of tree seeds. In 1892, there were distributed 983 packages of trees and 918 bundles of cuttings of promising varieties of Russian Poplars and Willows. In 1893, 830 packages of trees, 798 of cuttings and 214 of mixed cuttings and trees. In addition, there were distributed that year 1,523 bags of tree seeds. These tree cuttings and tree seeds were nearly all sent on request to settlers on the North-west plains, where trees are absent or very scarce. In 1890 and 1891, larger packages of promising trees and shrubs were also sent to the Mounted Police stations and Indian agencies, also to the experimental gardens of the Canadian Pacific Railway located in the North-west at different points along the main line. My thanks are also due to Mr. Craig for the willing help rendered me in extending the forest plantations on the central farm in 1890 and 1891, also for the supervision given to their care during those years.

Experience has shown that the experiments conducted with native tree seeds and cuttings of poplars and willows have been more successful than those with most of the young trees. The box elder has however generally done well when grown from seed collected in the North-west.

Now that a very large amount of such material is available at the branch farms at Brandon, Man., and Indian Head, N.W.T., it is proposed to carry on the distributions

in future mainly from these points. It is probable that young forest trees and wood for cuttings of poplars and willows grown in the climate in which they are to be planted will prove hardier and better adapted to the country than if grown in the east, they will also reach their destination with less delay. A good supply of native tree seeds can also usually be obtained in the North-west.

Several of the varieties of Russian poplar and willow—cuttings of which have been distributed from the central farm and of which there is now material in abundance for further distribution at the branch farms in the North-west—are noted for their rapid growth. They also make shapely and useful trees for wind breaks and shelter belts and would in a few years if planted in sufficient numbers be useful for fuel. Fig. 10 repre-



FIG. 10.—RUSSIAN POPLAR. *P. certinensis*.

sents a specimen of one of the best of these poplars, *Populus certinensis*, which was planted as a young tree in the Arboretum at the Central Farm in 1889. During the five years which have since elapsed, this tree has grown to a height of 25 feet or more and its branches expand about 15 feet, while the trunk two feet from the ground has a

diameter of about 8 inches. Nearly equal growth has been made by the Voronesh willow, Fig. 11, and the laurel leaved willow represented by Fig. 12, planted also in 1889.



FIG. 11.—VORONESH WILLOW.



FIG. 12.—LAUREL LEAVED WILLOW.

Both of these willows when planted in the open soon make fine round-headed bushy trees, which make very rapid growth and soon furnish useful shelter.

REPORT OF THE FOREMAN OF FORESTRY.

The spring of 1894 was a very early one and work was begun in connection with the division of forestry and ornamental grounds during the first week of April. The mulching of barnyard manure which covered the lawns was removed and the grass was uninjured, excepting in a few exposed places where there was no mulch, and where the snow had been blown off. During the spring and summer the grass was regularly cut by the pony lawn mower, and the lawns at all times looked well.

Tree planting was begun on the 18th of April and continued until May 30th.

The horse cultivator was used throughout the season among the trees and shrubs as often as necessary, which kept the surface of the soil loose and the weeds subdued. Very little cultivating was required in the forest belt along the western boundary of the farm, as the trees there are large enough in the rows (5 feet apart) to shade the ground and prevent weeds from growing; the same may be said regarding a great many of the trees in the rows 10 feet apart. In the older plantations of trees in the mixed belt along the northern boundary, very little cultivation was found necessary.

The trees and shrubs on the farm have, in nearly all cases, made good growth.

REPLACING TREES IN FOREST BELT ALONG WESTERN BOUNDARY.

By consulting the list of trees given in the report for 1893 as living in the forest belt along the western boundary, it will be seen that there still remained a number of vacancies to be filled. In this plantation the experiment is that of growing trees in blocks all of the same species. In cases where the trees have grown so as to shade the entire surface, it was considered unnecessary to fill the vacancies with young trees of the same species for the reason that they would, in all probability, be smothered by the larger trees before they could establish themselves. Where the species were not perfectly hardy, the same kinds were not always re-planted. For the first time since the forest belt was begun, several trees, eight in all, were girdled by mice, all of which were White Ash (*Fraxinus Americana*). There were 131 trees replaced in this belt to fill vacancies.

MIXED FOREST BELT, PLANTATION OF 1893.

In last year's Annual Report a list was given of the trees added to the mixed forest belt during the spring of 1893; also the number of these which had died during the summer of that year. Another record was taken in the spring of 1894, and it was found that 25 more had died in the winter of 1893-94. Of these 8 were *Ulmus montana* and 17 *Acer Pseudoplatanus*, neither of which species are perfectly hardy here. The vacancies caused by the death of trees during the summer of 1893 and the winter of 1893-94 were filled, and in the case of *Acer Pseudoplatanus* and *Ulmus montana*, replaced by hardier species. This plantation has made very gratifying growth, and towards the close of the season when the growth was completed, in some cases the trees were already touching one another. During the growing season, the soil was kept frequently stirred by the horse cultivator, and to this is to be attributed, in a large degree, the satisfactory growth which the trees have made.

MIXED FOREST BELT, PLANTATION OF 1894.

To complete the mixed forest belt along the northern boundary of the farm, there remained yet to be planted a strip of land a little more than 500 yards long, extending to Preston street, the greater portion of which had always been one of the roughest parts of the farm. Beginning at the hill opposite Fourth Avenue there was a steep bank sloping to the east. This was partly filled with stones which had been gathered from the farm. In October this stone was covered with a thick coating of soil sufficient

to make a gradual descent to the base of the hill For the next 500 feet the surface of the land was about level and the soil of a moist, peaty nature. The rest of the land was more or less stony or gravelly. In places where the solid rock came too near the surface, a coating of soil was put over it sufficient to start the young trees, and any very uneven places were filled in with soil. The land was ploughed and harrowed and the stones taken off before the trees were planted.

The forest belt was completed to Preston Street before winter set in, thus making a continuous belt about sixty feet in width along the northern boundary of the farm, with the exception of the breaks caused by a roadway and the Prescott and Ottawa Railway. Even now, before the trees have made any growth, the improvement made by the levelling of the land and the planting of the trees is very marked.

The following is a list of the species planted and the number of trees of each species —

ADDITIONS TO MIXED FOREST BELT.

<i>Acer platanoides</i> —Norway maple.....	62
<i>Acer Pseudoplatanus</i> —Sycamore maple.....	1
<i>Acer Saccharinum</i> —Sugar Maple.....	113
<i>Æsculus Hippocastanum</i> —Horse-chestnut.....	22
<i>Betula papyrifera</i> —Canoe birch.....	180
<i>Euonymus atropurpureus</i> —Burning bush.....	11
<i>Fraxinus Americana</i> —White ash.....	186
“ <i>pubescens</i> —Red ash.....	323
“ <i>sambucifolia</i> —Black ash.....	225
<i>Gymnocladus Canadensis</i> —Kentucky coffee-tree.....	10
<i>Juglans nigra</i> —Black walnut.....	71
<i>Larix Americana</i> —American larch.....	146
<i>Negundo aceroides</i> —Box elder.....	366
<i>Pinus Cembra</i> —Swiss stone pine.....	15
“ <i>Mughus</i> —Mountain pine.....	77
“ <i>ponderosa</i> —Heavy wooded or Bull pine.....	83
“ <i>Strobus</i> —White or Weymouth pine.....	83
“ <i>sylvestris Rigaensis</i> —Riga pine.....	160
<i>Picea alba</i> —White spruce.....	48
“ <i>excelsa</i> —Norway spruce.....	437
“ <i>pungens</i> —Rocky Mountain blue spruce.....	68
<i>Pseudotsuga Douglasii</i> —Douglas' spruce.....	124
<i>Pyrus Aucuparia</i> —European Mountain ash.....	11
<i>Quercus alba</i> —White oak.....	53
<i>Tsuga Canadensis</i> —Hemlock spruce.....	3
<i>Thuya occidentalis</i> —Common arbor-vitæ.....	139
<i>Ulmus Americana</i> —White elm.....	353
“ <i>racemosa</i> —Rock elm.....	72
Total.....	<u>3,442</u>

TREES IN FOREST PLANTATIONS.

Now that the forest belt along the northern boundary is completed a list of all the trees in the various forest plantations may be given.

The following summary is submitted :—

	Trees.
Forest belt along western boundary.....	9,701
Mixed forest belt along northern boundary, older plantations.....	2,329
Mixed forest belt along northern boundary, plantations of 1893.....	3,511
“ “ “ “ “ of 1894.....	3,442
Evergreen clump.....	1,856
Total number.....	<u>20,839</u>

ADDITIONS TO TREES AND SHRUBS ON ORNAMENTAL GROUNDS.

During the spring of 1894 the work of planting additional trees and shrubs on the ornamental grounds was carried on. Several new clumps were arranged and a number

of single specimens planted, there are now growing on the ornamental grounds in all 2,206 specimens.

NEW HEDGES.

A hedge of *Arbor vitæ* (*Thuya occidentalis*) was planted along Preston street, comprising 500 trees. As the road had been graded and the soil where the hedge was to go being of very poor quality, new soil was drawn and put in the trench prepared for the young trees. The trees used for this purpose were larger than is desirable and had to be severely cut back. Most of them have lived during the summer and promise fairly well.

The inclosure, near the Director's house, prepared mainly for special hybridizing experiments, having been found too small for the purpose, was enlarged during the fall of 1893, and in the spring of 1894, hedges of white spruce (*Picea alba*) and *Arbor vitæ* (*Thuya occidentalis*) were planted along the extended sides and end. There were planted, 121 white spruce and 116 *Arbor vitæ*.

A hedge composed of 393 Norway spruce (*Picea excelsa*) was planted along the eastern boundary of the orchard from the corner of the poultry yard to the junction of the eastern and northern boundary. Nearly all of the young trees have lived.

The following summary of all the trees and shrubs in all the permanent plantations on the Farm, excepting those in the Arboretum, is herewith submitted.

	Total number of trees.
Forest belts.....	20,839
Avenue trees.....	971
Trees and shrubs on ornamental grounds.....	2,206
Hedges	11,719
Total	<u>35,735</u>

SEEDING DOWN AMONG ORNAMENTAL CLUMPS OF TREES AND SHRUBS.

Since the ornamental planting was begun on this farm, the clumps of trees and shrubs, where not on permanent lawns, have been kept cultivated with the horse cultivator in order to promote their growth and to destroy weeds. As these clumps had been cultivated in this manner for several seasons, the weeds subdued, and the trees in most cases well established, most of the land on which the groups were, was seeded down during the past season. Nearly everywhere the grass has taken well and with a light mulch of manure which has been spread over it this fall, it is hoped that the grass will come through the winter in good condition. That growing immediately around the trees has been removed and the soil will be kept loose at the surface so that the trees may have favourable conditions for making rapid growth. In addition to the seeding down of the ornamental clumps a new lawn has been made, about an acre in extent, leading to the office building and adjoining the residences of the officers. A part of this land was graded and prepared and the lawn grass seed sown during the autumn of 1893, and the remainder in the spring of 1894. Most of the grass sown in the autumn came through the winter well, a few spots only having to be re-sown where the wash of water in the spring had carried away some of the soil. Before the summer ended the whole area was under sod. This new lawn has also been lightly mulched with barnyard manure this fall to protect the newly formed sod. It is intended to utilize part of this ground for the testing of perennial flowers which will be grouped in beds prepared for this purpose. Already one bed has been planted with a large collection of lilies and another with irises.

A sufficient area was also sodded around the house occupied by the poultry manager, and a large part of the planted area in the Arboretum was seeded down with suitable lawn grass mixtures. That sown early in the season has formed a fairly good sod and it is hoped that by the end of next season the whole area will be covered with good sod.

W. T. MACOUN.

NOTES ON GERANIUMS.

The work conducted on the Experimental Farms has a wide range and embraces, in addition to everything which is of direct importance to farmers and fruit growers in their work, the subjects of ornamental trees, shrubs and flowers including plants valuable for decorative purposes both without and within the house. Information gained and given on these matters will, it is hoped, prove useful not only to farmers and their wives but also to all classes of our people who take an interest in these subjects and lead to the more general beautifying of Canadian homes, thus making them more attractive. The following notes on varieties of geraniums which have been tested at the Central Experimental Farm have been prepared by Mr. W. T. Ellis, foreman of the seed testing and propagating houses, and cover the experience of the past three years with many sorts, also tests of a number of the newer varieties for shorter periods. The careful notes which Mr. Ellis has made of the experience gained here as to the suitability of the different varieties for bedding and pot culture will, it is hoped, prove interesting and useful to many.

REPORT ON GERANIUMS PLANTED OUTSIDE, 1894.

La Vestale.—Plants very small and not well rooted, when planted out. Made very fair growth and bloomed profusely, colour pure white and does not shade, truss large, on long footstalk standing well up, foliage pale green with faint zone. Promises to be the best white variety tried.

Leon Perault.—Free growing with compact habit but stems weak and do not stand up well, made fair growth and bloomed very profusely, colour brilliant fiery scarlet, large truss on long footstalk, a very promising variety for bedding out.

Ernest Lauth.—Very free growing, compact habit, stems strong and short jointed, foliage large, bright green, with faint zone, very free blooming, double, large truss, flowers well formed, colour bright magenta crimson, a good bedding variety.

S. A. Nutt.—A very free growing variety, foliage large, dark green, with faint zone. Very free flowering, immense truss, double, rich deep crimson, on long footstalk. The best double variety for pot culture, and for bedding out.

Mary Hallock Foote.—A very strong coarse growing variety, small truss of salmon coloured flowers, very shy bloomer, not a desirable sort.

Sam Sloan.—A magnificent variety, strong free growing, wood rather long jointed, foliage deep green, very large and velvety with faint zone. Bears an immense truss of rich deep crimson single bloom, on long footstalk, individual florets very large and perfectly shaped. The best geranium for bedding purposes we have tried, as it is one mass of crimson bloom the whole season until cut down by frost.

Souvenir de Mirande.—Strong growing variety, with light green foliage, flowers well formed, upper petals white with salmon rose edge, lower petals rose streaked with white, medium sized truss. Has not done well, planted out, and is useless for winter blooming indoors, and of but little value even in summer.

Mazeppa.—A very free growing variety, stems shortjointed, foliage large dark green, with faint zone, very free flowering, immense truss, colour deep carmine scarlet, a good single geranium, one of the best for bedding purposes, and unsurpassed for pot culture as a winter blooming variety.

Fanny Thorpe.—A very free growing variety with dwarf, shortjointed, compact habit, foliage large, dark green, with broad dark zone, distinctly marked, medium sized truss of delicate rose colour, outer edge of petals white, very free flowering. One of the best geraniums for bedding purposes, and first class for pot culture, as a winter flowering variety. Single.

B. K. Bliss.—A very strong free growing shortjointed variety, with light green velvety foliage, flowers double of a vivid fiery scarlet, borne freely on a medium size truss, with long footstalk. Good for bedding out and pot culture.

Mme. Ayme de Chevrelie.—A strong free growing variety, with dwarf, bushy, compact habit, foliage large, pale green. Immense truss of double pure white bloom, borne

on long footstalk, blooms have a rather ragged appearance, very free flowering, and a decided acquisition both for bedding purposes and pot culture.

M. Adrien Corret.—Strong growing, compact habit, large pale green foliage, large truss of double cherry scarlet bloom, very free flowering. First class for bedding and pot culture.

Gloire de Lyonnaise.—A very strong free growing variety, large velvety foliage, of light green colour, with faint zone in the old leaves. Bears an immense truss of bright orange scarlet flowers, lower petals shaded rose. Have measured individual florets 3 inches in diameter. One of the best single flowered geraniums in cultivation both for bedding and for pot culture.

La Favorite.—Strong growing and of dwarf compact habit, foliage large and pale green in colour. Flowers double, pure white, large truss, most perfectly formed florets of any variety tried here. Very free flowering when planted out. Grown in pots this variety makes good healthy growth but does not bloom at all satisfactorily.

Mrs. A. Blanc.—Very strong, tall growing variety, foliage very large, dark green and velvety, with dark, strongly marked zone, very free flowering bearing an immense truss of large flowers on long footstalk, colour apricot red, veined with a darker shade. Good both for bedding and pot culture.

Gloire de France.—A strong free growing variety, with large pale green foliage with dark zone. Bears an immense truss on long footstalk, individual florets very large and double, colour salmon white, with red eye. First class for pot culture and promises well for bedding.

Renaissance.—Slender growth, compact habit, foliage small pale green with dark zone, flowers single, large truss, free bloomer, colour rose with white eye. Has not succeeded well planted out, but was not placed under favourable conditions. A good variety for pot culture but is very apt to lose its foliage if allowed to suffer from lack of water.

Prokop Daubec.—A strong robust grower, shortjointed, large dark green foliage with faint zone. A beautiful double free flowering variety, colour bright rose. Good for pot culture, and also for bedding.

James Vick.—A very strong growing variety, with large dark green foliage, truss and flowers large, double, flesh coloured, but borne sparingly. Not a desirable variety for bedding or for pot culture.

Beatrice.—Dwarf compact habit and free grower, foliage dark green and velvety, truss medium size, borne on long footstalk, colour white with rose eye, very free flowering. One of the best geraniums in cultivation for pot culture, for blooming during the winter months. Has not succeeded well when planted out.

Imogene.—Dwarf compact habit and free growth, foliage small, very dark green, with darker zone, medium sized truss very free flowering, colour blush shading to crimson in centre. First class for pot culture, always covered with bloom. Has never succeeded when planted out.

Satisfaction.—Strong, free and compact habit of growth, foliage large and glossy, very free flowering, large truss on long footstalk, colour beautiful soft rose, a very good variety for bedding and also for pot culture.

Queen of the West.—Very free growing variety, of compact habit, glossy dark green foliage, with zone distinctly marked, very free flowering, medium sized truss, colour orange scarlet, one of the best bedders, stands all kinds of weather, but of no use for pot culture.

General Grant.—Very free and compact habit of growth, light green foliage, free flowering, medium sized truss, colour brilliant scarlet, first-class bedder, stands all kinds of weather; of no use for pot culture.

Garden Director.—Very strong, free growing variety, foliage dark velvety green, with faint zone. Very free flowering, bears a large truss on long footstalk, individual florets very large, semi-double, colour orange scarlet, a good bedder, but of no value for pot culture.

Madame Saleroi.—Very dwarf, compact habit, thrifty, healthy growth, foliage very small, clear green, edged with pure white. A first class variety for edging, as it rarely grows more than six inches high.

The above varieties have all been tried here two years or more, and in recommending the best, it is difficult to make a selection, where all are good, but for bedding, the following six single varieties are recommended.

La Vestale, pure white, Sam Sloan, crimson, Fanny Thorpe, rose edged with white, Gloire de Lyonnaise, orange scarlet shaded rose, Mazeppa, carmine scarlet, Queen of the West, orange scarlet. The following are recommended as the six best doubles for bedding: S. A. Nutt, crimson, B. K. Bliss, bright scarlet, M. Adrien Corret, cherry scarlet, Mme. Ayme de Chevrelère, white, Ernest Lauth, magenta crimson, Satisfaction, rose.

The best of the above named varieties for pot culture are, singles: La Vestale, Mazeppa, Fanny Thorpe, Gloire de Lyonnaise, Sam Sloan, Beatrice and Imogene; doubles, S. A. Nutt, B. K. Bliss, Mme. Ayme de Chevrelère, M. Adrien Corret, Ernest Lauth and Gloire de France.

VARIETIES OF LATER INTRODUCTION.

Wm. Pfitzee.—A very strong free growing variety, compact habit, foliage very large, dark green, velvety, with faint zone. Very free flowering, immense double truss, on long footstalk, colour, bright orange salmon, distinctly edged with white. One of the most beautiful and showy varieties tried here. A decided acquisition as a winter blooming geranium for pot culture. When in rapid growth the wood being soft it requires more care in watering than other geraniums, as if the soil is kept too wet the wood is apt to rot at the base of the stems, but we have found no difficulty in growing it successfully if the soil is kept rather dry, and when the wood is thoroughly ripened all danger from this cause is past. It also gives promise of being one of the best of the newer varieties for bedding.

Meteor.—Strong growing compact habit, foliage large bright green with dark zone, flowers, single, bright scarlet, large truss, very free flowering, gives promise of being one of the best for bedding purposes: has not done well as a pot plant.

Panache de Nancy.—Weak straggling growth, very poor habit, flowers small and truss small, colour salmon, streaked with white, not at all desirable either for bedding or pot culture.

Ingenieur Parlier.—A very strong growing variety, with large pale green foliage, flowers borne in large truss on long footstalk, colour violet red, double, free flowering, has done well as a pot plant, and promises to be a good bedder.

Chaplin.—Very strong, free growing variety, with large velvety leaves of dark green colour, flowers freely, large truss, bright scarlet, semi-double. Not as good as Garden Director, which it much resembles.

Buffalo Bill.—Large strong grower, glossy green foliage with a dark zone, flowers double, large truss, colour creamy white, marbled with rose. A very shy bloomer.

Copernic.—A strong free grower, with large glossy foliage, large truss, flowers single, rosy carmine, shading to salmon with white eye. Made good growth, but did not bloom well.

Admiration.—A strong dwarf, freegrowing variety, with light green velvety foliage, very free flowering, double, colour pale rose shading deeper to the eye, large truss. A very good variety for pot culture, and did well bedded out under adverse circumstances.

NOTE.—I find this variety catalogued under the head of singles.

L'Immortelle.—Very dwarf compact habit, dark green foliage with faint zone. Large truss, colour dark magenta streaked with lighter lines, a very shy bloomer, and has not done well either planted out, or as a pot plant.

M. G. Meynot.—Made very weak growth, single flower, large truss, colour salmon pink with white eye, upper petals shading to white, a rather shy bloomer.

Alfred Tennyson.—A strong, free growing variety. free flowering, trusses large, on long stout footstalks, colour, bright orange scarlet, upper petals shaded with lilac, semi-double. A very promising variety.

Mad. Alfred Mame.—Made fair growth, flowers freely, truss large, colour rosy scarlet. A promising single flowering sort.

Sir Trevor Lawrence.—A very free, strong growing variety, truss large, flowers perfectly formed, and freely borne, double, colour rosy pink, a very promising sort.

Golden Dawn.—Of medium growth, compact habit, free flowering, truss medium size on long footstalks, florets large, colour orange scarlet, double, a promising variety.

Van Dael.—Made very weak growth, flowers poor and sparsely borne, colour salmon rose bordered with white.

Mad. de la Rue.—Made fair growth, fine large truss of full double bloom, colour orange scarlet. A promising variety.

E. Legouve.—Made fair growth, flowers semi-double, immense truss, rather loose, on strong stiff stem, colour, orange salmon. A very distinct variety.

Comte d'Elbe.—Made fair growth, habit compact, foliage darkly zoned, very free flowering, truss large but rather loose and flowers ragged, colour, rosy pink. A very promising variety.

Gettysburg.—Very free growing dwarf, compact habit, foliage large, dark green, with well marked zone, very free flowering, truss large, flowers well formed, colour bright crimson maroon, a decided acquisition, the best of the new introductions.

J. J. Harrison.—A very strong free grower, foliage large, pale green, and velvety, very free flowering, semi-double, large truss, and individual florets very large, colour, brilliant scarlet. Has done well planted out.

Lord Lytton.—Dwarf, strong growing and branching, with large pale green foliage, very free flowering, truss large on long footstalk, double, colour cherry red, upper petals orange red. Has done well here and promises to be one of the best of the newer varieties.

M. Remy Martin.—Very free growing, and dwarf branching habit, blooms very profusely, large truss on long footstalk, colour bright rose, upper petals marked with white, double. A promising variety.

Carmen Sylva.—A very strong grower, free flowering, large truss, colour white, did fairly well planted out.

Mrs. J. M. Garr.—Made fair growth, dwarf, compact habit, free flowering, medium sized truss, single, colour white, but apt to shade to rose when exposed to the sun. Not so good as some other white varieties.

Aurora Boreale.—A strong free growing variety, free flowering, single, truss large on long footstalk, colour pale rose with white eye. Succeeded well planted out.

Dr. Levassasseur.—Free growing, dwarf compact habit, free flowering, medium sized truss, florets large, colour lower petals orange cerise marked with lilac, the upper petals lilac, veined with red and edged with cerise. One of the best of the newer varieties.

White Swan.—Made fair growth, dwarf, compact habit, double, free flowering, truss medium size, colour white, blooms well the whole season, but is not specially desirable as there are several better of the same class.

Prof. Peuch.—Very dwarf compact habit, very free flowering, truss and flower large but rather ragged, colour magenta rose, single.

Chas. Jolly.—Made very strong growth, habit of plant dwarf and compact, large fine shaped truss, colour orange scarlet, very free flowering, double. One of the best of the new varieties.

Banquise.—Made very weak growth and did not bloom.

Chr. Larelle.—A free strong growing variety, very free bloomer, truss large on long footstalk, large individual florets, colour salmon rose, edged with white. One of the best of the new varieties.

Mrs. Parker.—Very free growing compact habit, foliage bright green with white edge, flowers pale pink.

P. Crozy.—A free growing variety, makes a dwarf bushy plant, foliage medium sized and of heavy texture, free flowering, truss medium sized, colour bright scarlet, a fine variety. This is a hybrid between the zonale and the ivy sections of geraniums, showing the characteristics of the zonale in the foliage, and the ivys in the flowers.

The 33 varieties last named were tried for the first time planted out last season. Many of them were grown under conditions not calculated to give the best results, therefore it would be unwise to condemn any of these without further trial which

it is the intention to make during the coming season. The following are considered the most promising for bedding: Meteor, single, Ingenieur Parlier, double, Ch. Larelle, single, Lord Lytton, double, Sir Trevor Lawrence, double, Aurora Boreale, single, Gettysburg, single, Dr. Levavasseur, single, Chas. Jolly, double, and Wm. Pfitzee, double. The last named has been grown two seasons in pots and has proved to be one of the best for winter blooming.

TUBERCULOSIS AT THE BRANCH EXPERIMENTAL FARMS.

In Bulletin No. 20, in which particulars are given regarding the results of tests of the cattle at the Central Experimental Farm for tuberculosis, the announcement was made (p. 33) that arrangements were in progress for a similar thorough testing of all the animals at the branch experimental farms. In accordance with instructions received from the Hon. Minister of Agriculture the necessary preparations were made for the carrying out of this investigation, and the branch farm at Brandon, Man., was first visited.

EXPERIMENTAL FARM, BRANDON, MAN.

On arrival on the 19th of July, 1894, I found that the cattle composing the herd there consisted of 28 animals, 4 of which were grades and 24 were pure bred of the following breeds :—

	Cows.	Heifers.	Bulls.
Durhams.....	4	2	2
Ayrshires.....	2	..	3
Holsteins.....	2	1	2
Galloways.....	2	1	1
Herefords.....	..	1	1

A short time before my arrival these animals had been carefully inspected and four of their number had been isolated from the rest of the herd as showing symptoms of disease. The remaining animals were regarded as healthy. They were in good condition and most of them appeared to be in robust health.

Having secured the assistance of Dr. F. Torrance, V.S., of Brandon and Dr. S. J. Thompson, V.S., of Carberry, Provincial Inspector for the Province of Manitoba, the normal temperature of each animal was taken (per rectum) on the evening of the 19th and morning of the 20th of July. The tuberculin was injected at 11 a.m., and the temperature of each animal taken subsequently every three hours for a period of 21 hours with the results shown in the following table :—

TUBERCULIN tests at Brandon, N.W.T.

Name of Animal.	No. of Minims Inject'd.	Normal Temperature.		Temperature after injection of Tuberculin, July 20, 11 a.m.						
		July 19.		July 20.						
		8 p.m.	11 a.m.	2 p.m.	5 p.m.	8 p.m.	11 p.m.	2 a.m.	5 a.m.	8 a.m.
<i>Durhams.</i>										
1. Rose of Sydenham.....cow, 8 years.	70	*	101.9	101.5	103.0	107.0	107.0	106.2	104.3	103.3
2. Rose of Darlington....." 4 "	70	102.2	101.8	102.2	101.4	104.4	106.2	106.2	104.8	103.2
3. Cowslip....." 4 "	60	102.6	101.3	102.3	103.6	104.4	104.1	103.9	103.0	103.2
4. Fashion....." 3 "	60	102.8	101.2	102.7	102.8	103.4	105.9	105.8	106.0	105.1
5. Countess of Brandon.....heifer, 1½ "	50	.....	102.0	102.2	102.0	105.0	106.2	106.7	106.2	106.0
6. Fashion's calf....." 6 mos...	25	101.9	101.6	102.0	101.5	102.4	102.4	102.2	101.9	101.9
7. General H.....bull, 3 years.	80	101.6	101.6	101.9	102.4	106.4	107.2	106.0	104.6	105.4
8. Brandon Hero....." 2 "	55	102.6	101.6	101.8	101.7	101.8	101.8	101.5	100.7	100.0
<i>Ayrshires.</i>										
9. Jewel.....cow, 5 years.	60	101.0	101.0	102.2	102.0	105.9	106.4	106.2	106.3	106.8
10. Dandy II....." 5 "	60	101.8	102.1	102.2	99.9	101.8	101.2	101.5	101.8	101.3
11. Middlesex.....bull, 3 "	80	101.3	102.3	102.0	102.5	106.0	106.0	105.4	105.1	103.6
12. Dandy Jock....." 1 "	30	102.6	101.4	101.0	102.4	104.8	106.3	106.0	105.2	105.0
13. Brandon Prince....." 1 "	40	102.5	101.8	101.6	103.5	106.5	106.6	106.1	106.1	106.0
<i>Holsteins.</i>										
14. Queen of Waterloo.....cow, 6 years.	60	102.2	102.9	103.1	102.1	103.0	103.7	106.0	105.6	103.1
15. Leda....." 5 "	70	102.6	101.2	102.5	101.4	102.0	101.8	101.6	102.0	102.0
16. Princess of Holland.....heifer, 1½ "	40	.....	101.8	101.6	101.2	103.6	105.6	106.9	106.1	104.6
17. Holland Prince.....bull, 3 "	80	101.6	101.6	101.7	102.3	104.9	106.5	106.0	105.3	103.2
18. Manitoba Prince....." 1 "	40	102.4	101.1	102.8	102.4	102.4	102.5	102.3	102.1	102.4
<i>Galloways.</i>										
19. Violet.....cow, 8 years.	60	.....	101.4	101.5	101.6	103.0	105.0	105.7	104.8	104.8
20. Hannah B....." 6 "	60	.....	102.4	102.9	103.8	107.0	106.0	105.1	106.0	105.5
21. Juno.....heifer, 2 "	50	.....	102.5	101.6	103.4	106.6	106.7	106.3	106.0	105.7
22. Chester.....bull, 7 "	80	101.6	101.1	102.0	102.0	104.5	107.2	106.3	106.1	106.3
<i>Herefords.</i>										
23. Hereford heifer.....1 year.	35	101.9	101.6	102.0	102.6	104.6	104.6	103.4	102.5	102.2
24. Hereford bull.....2 "	50	102.9	101.6	102.1	103.0	105.6	106.6	106.8	106.1	106.8
<i>Grades.</i>										
25. Grade steer.....2 years.	55	.....	102.2	101.8	103.5	106.9	106.2	106.8	107.0	106.2
26. Lily.....cow, aged "	70	102.1	102.8	104.5	103.0	106.8	106.7	105.8	104.3	103.4
27. Daisy....." "	60	101.4	101.0	101.8	99.2	101.1	102.0	102.0	102.2	102.0
28. Grade calf.....4 mos.	20	102.8	102.2	102.0	102.3	102.5	102.4	102.0	102.3	101.7

* Several of the animals could not be got in from pasture in time for the first test of normal temperature.

From this table it will be seen that of the 28 animals tested 21 showed a rise in temperature of from two to six degrees Fahrenheit, thus indicating a diseased condition. This result was a matter of surprise to all as so many of them appeared to be healthy, vigorous and in good condition and had never shown any symptoms of disease. The diseased animals were all killed the following day and a careful postmortem examination made in each case with the following results :

1. Rose of Sydenham, Durham cow, 8 years.—Lining of the thoracic cavity covered with many large and small masses of grapy tubercle, partly cheesy and partly calcareous, peritoneum also covered with finely granular tubercles. Lungs with many small patches of tubercle in their substance and small masses distributed over the surface. About one-fourth of the udder was much affected and almost solidified with tubercle.
2. Rose of Darlington, Durham cow, 4 years.—A large portion of one lung was filled with soft tuberculous matter ; the other lung was healthy. Thoracic glands enlarged and filled with solidified tubercle. The udder was slightly tuberculous, and attached to the womb there was found a considerable quantity of soft tuberculous matter.
3. Cowslip, Durham cow, 4 years.—In the right lung there were several large cavities filled with tubercle, varying in consistence, some soft and partly fluid, and some solidified. The left lung was healthy. Thoracic glands enlarged and filled with caseous and calcareous tubercle. The tip of one lobe of the liver was also diseased by deposit of tubercle.
4. Fashion, Durham cow, 3 years.—The left lung had a large tuberculous mass in its substance, grapy tubercular deposits were found on the walls of the thorax, and the thoracic glands were enlarged and filled with tuberculous matter, some of which was soft but solidified and some hard and calcareous.
5. Countess of Brandon, Durham heifer, 1½ years.—The lungs in this animal were healthy and there was no appearance of disease on the lining of the thoracic cavity. In the thoracic glands were found small masses of tubercle and several of the mesenteric glands were enlarged and filled with calcareous tubercle.
7. General H., Durham bull, 3 years.—In one lung a large abscess was found just under the surface filled with solidified tubercle, some of it surrounding the cavity, being calcareous. Tuberculous matter was also found in two of the thoracic glands ; in one case in small quantity and in an early stage, and in the other the gland was enlarged and filled with semi-solid tubercle. Some of the mesenteric glands were also tuberculous.
9. Jewel, Ayrshire cow, 5 years.—Lungs healthy ; one of the thoracic glands enlarged and filled with solidified tubercle. Small tubercles were found on the outer surface of the stomach and small granules of a tuberculous character on the surface of the spleen.
11. Middlesex, Ayrshire bull, 3 years.—Substance of lungs healthy, but some small tubercles were found on the surface. One of the thoracic glands was enlarged and filled with solidified tubercle. Surface of the spleen also dotted with a few small tubercles.
12. Dandy Jock, Ayrshire bull, 1 year.—Surface of both lungs dotted with miliary tubercles, no disease found in their substance, lining of thoracic cavity covered with grapy deposit of tubercle. Thoracic glands enlarged and partly filled with tubercle most of which was in a calcareous condition.
13. Brandon Prince, Ayrshire bull, 1 year.—Surface of one lung dotted with small miliary tubercles, otherwise lungs appeared healthy. Thoracic glands somewhat enlarged and filled with cheesy tubercle.
14. Queen of Waterloo, Holstein cow, 6 years.—In this animal the lungs and all the other organs appeared to be healthy and no disease was found in any of the thoracic, mesenteric or other glands, but many small tubercles were found scattered over the surface of the inner lining of the bowels.
- 16.—Princess of Holland, Holstein heifer, 1½ years.—The lungs were free from tubercle, but specimens of a small parasitic worm were found in the bronchial tubes.

Small tubercles were found in considerable numbers on the outer surface of both large and small intestines.

17. Holland Prince, Holstein bull, 3 years.—Lungs and other organs healthy. Some small tubercles were found in one of the thoracic glands and two others were packed solid with calcareous tubercle.

19. Violet, Galloway cow, 8 years.—A large part of one lung was found filled with semi-solid tuberculous matter, the other lung was free from disease. Several of the thoracic glands were also filled with solidified and calcareous tubercle.

20. Hannah B, Galloway cow, 6 years.—Lungs healthy, gland behind pharynx partly filled with calcareous tubercle. In the liver a small cavity was found about one inch in diameter filled with soft tubercle, some small tubercles were also found on the surface of the spleen.

21. Juno, Galloway heifer, 2 years.—Tubercle was found in several places in the substance of the lungs. The thoracic glands were enlarged and filled with tuberculous matter, some of it was of a soft solid consistence, some calcareous.

22. Chester, Galloway bull, 7 years.—In one lung was found a mass of tubercle about the size of a hen's egg, also a tubercular abscess about same size near the base, the other lung was free from tubercle. The thoracic glands were partly filled with solidified tubercle. Some tuberculous masses were found in the rectum and other larger masses lodged in fat surrounding the third stomach and also in fatty matter among the intestines.

23. Hereford heifer, 1 year.—Only one small tubercle was found in the substance of the lungs, but small tubercles were scattered over the entire inner surface of the thorax. The thyroid glands were enlarged and filled with soft tubercle; surface of intestines dotted with small tubercles.

24. Hereford bull, 2 years.—One lung had a mass of tubercle just below the surface near the tip, the other lung was healthy. There was a slight grapy deposit on the lining of the thorax, and the thoracic glands were partly filled with solidified and calcareous tubercle.

25. Grade steer, 2 years.—In one lung there was a mass of tubercle near the tip, otherwise the substance of the lungs was healthy, the surface of the thoracic cavity was dotted with grapy tubercle, and the thoracic glands were enlarged and filled with tubercle, partly of a cheesy consistence and partly calcareous. Small tubercles were also found on the surface of the spleen.

26. Lily, grade cow, age unknown.—A large mass of tubercle was found in one lung near the tip, the other lung was healthy, the thoracic glands were enlarged and filled with soft solidified tuberculous matter; large grape-like masses of tubercle were attached to the inner lining of the thorax, and a large tumour was found attached to the lower side of the diaphragm, enclosing soft tuberculous matter.

Of the 21 animals destroyed 19 were pure bred, and 2 were grades. Nine of these were bred in Manitoba and twelve came from Ontario. The course adopted in this instance and subsequently followed at the other branch farms was to bury the animals about six feet below the surface, and scatter lime freely over the bodies before filling the hole.

The following instructions were left in each case regarding the cleansing and disinfecting of the buildings:—

Remove the remaining cattle and clean the buildings thoroughly, sweeping walls, woodwork and ceiling. When dry, spray thoroughly the whole surface, floors, woodwork of divisions, walls and ceiling with the following disinfecting solution:

1 lb. corrosive sublimate (corrosive chloride of mercury).

$\frac{1}{2}$ lb. chloride of ammonium (muriate of ammonia), dissolved in a 40 gallon barrel of water.

Repeat the spraying after two days, then whitewash the whole of the woodwork, walls and ceiling with lime-wash containing glue or sugar to prevent it from rubbing off and coat with hot coal tar the floors of the stalls and the sides of the divisions for about one foot above the base.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

After completing the work at Brandon, I visited the Experimental Farm at Indian Head, arriving there on the morning of July 23rd. On this farm there were 39 head of cattle, three of which were calves under two months. Nine were grades and 30 pure bred of the following breeds :—

	Cows.	Heifers.	Calves.	Bulls.
Durhams.....	4	2	3	2
Holsteins.....	5	1	2	1
Polled Angus.....	6	..	2	2

In this instance I had the assistance of Dr. F. Torrance, V.S., of Brandon, and Dr. J. Harris, V.S., of Moosomin, N.W.T. The normal temperature of each animal was taken twice on July 24th, excepting the three young calves which were not tested, and the tuberculin injected at 5 p.m. the same day. Subsequently the temperature was taken at intervals of 3 hours for 18 hours, with the results shown in the appended table :—

Name of Animal.	No. of Minims injected.	Normal Temperature		Temperature after Injection of Tuberculin, July 24, 5 p.m.						
		July 24.		July 24.		July 25.				
		11 a.m.	2 p.m.	8 p.m.	11 p.m.	2 a.m.	5 a.m.	8 a.m.	11 a.m.	
<i>Durhams.</i>										
1. Cowslip, cow.....7½ years	60	102·8	101·7	103·2	103·0	102·2	103·1	105·3	103·7	
2. Red Rosebud, cow.....6½ "	60	102·9	102·4	103·5	103·1	102·4	103·2	104·2	103·6	
3. Nellie Elgins ".....3½ "	50	102·8	102·7	103·0	103·0	104·4	106·4	106·3	106·6	
4. Prairie Wildflower, cow...3 "	45	102·2	102·0	102·6	101·8	101·7	101·4	102·0	102·7	
5. Qu'Appelle Rosebud, heifer.1 "	30	102·7	102·2	103·0	102·5	102·3	102·5	102·6	102·1	
6. Rosebud's, heifer.....1 "	30	103·0	102·0	103·3	102·2	101·8	101·0	101·8	101·0	
7. Red Knight, bull.....3½ "	70	102·0	102·0	102·4	101·6	102·3	103·1	105·8	105·5	
8. Prince of Qu'Appelle, bull.1 "	40	104·3	103·7	104·8	103·1	102·7	101·0	102·3	102·0	
9. Calf of Prairie Wildflower, bull.....4 mos.	18	102·0	102·0	104·0	102·4	101·7	101·8	102·0	101·8	
<i>Holsteins.</i>										
10. Abi, cow.....7 years.	60	103·8	101·7	102·2	101·2	101·0	100·6	102·6	102·9	
11. Siepkje 3rds', Queen, cow..6 "	60	101·6	101·9	102·3	102·0	101·1	101·4	101·3	101·8	
12. Abi of Assiniboia, cow....3 "	45	102·2	102·0	102·0	101·2	100·9	101·2	102·0	102·8	
13. Abi 2nd of Assa., heifer...2 "	45	103·1	103·0	103·4	102·1	102·0	101·7	102·1	102·2	
14. Siepkje 3rd's calf, "....8 mos.	25	102·7	101·4	102·9	103·1	104·4	105·4	106·0	105·6	
15. Abi's calf, heifer.....4 "	18	101·2	102·0	102·9	102·2	101·8	102·2	101·8	101·3	
16. Netherland of Brandon, bull 1 year.	40	102·8	100·8	102·2	101·8	101·8	101·0	102·0	101·8	
<i>Polled Angus.</i>										
17. Pride of Eastview, cow....8 years.	60	101·5	100·9	101·3	100·8	100·9	103·2	105·0	105·4	
18. Stella of Eastview "....7 "	60	101·4	101·5	101·8	101·0	101·6	104·2	105·2	105·2	
19. Daisy of Eaton "....5½ "	60	101·7	101·9	101·4	100·6	101·0	101·5	103·0	104·0	
20. Lady of Eaton "....3½ "	55	102·0	101·8	102·0	101·2	102·2	104·4	106·0	105·4	
21. Stella of Assiniboia "....3 "	50	102·2	102·6	102·8	102·4	101·9	102·2	103·5	104·2	
22. Maid of Skeene "....3 "	50	101·4	101·3	102·6	101·7	101·6	100·9	101·5	102·0	
23. Duke of Eastview, bull....4½ "	70	101·8	101·6	101·2	100·7	100·5	100·7	100·8	101·2	
24. Polled Angus calf "....8 mos.	35	102·3	102·6	102·6	102·3	102·5	101·5	102·4	101·4	
25. Calf of Lady Eaton "....8 "	35	102·3	101·4	103·3	102·8	102·2	101·0	101·5	101·0	
26. Polled Angus calf "....6 "	25	101·8	101·6	103·6	102·0	101·4	101·7	101·3	101·7	
<i>Grades.</i>										
27. Susan, cow.....6 years.	55	101·7	101·4	101·4	101·2	101·2	100·6	101·5	101·7	
28. Sallie ".....6 "	55	101·7	101·9	101·9	100·8	100·6	100·4	101·5	101·0	
29. Daisy ".....3½ "	50	101·9	102·4	101·2	101·5	101·2	100·9	102·0	101·4	
30. Nellie, heifer.....2 years.	40	102·6	102·0	102·8	102·0	101·5	101·8	104·2	104·6	
31. Ayrshire grade, heifer...2 "	40	102·9	101·6	102·0	101·4	101·0	101·0	101·2	101·4	
32. Holstein ".....1½ "	35	101·9	101·6	102·7	101·8	101·0	101·0	101·5	101·5	
33. Grade, steer.....2 "	40	102·2	102·1	102·8	102·7	104·4	105·3	106·3	106·8	
34. Holstein grade, steer.....9 mos.	25	101·6	102·2	102·8	102·7	102·3	101·9	100·6	101·8	
35. ".....5 "	20	102·4	102·0	103·4	102·5	102·8	105·2	105·2	105·4	
36. Durham grade, heifer.....5 "	20	102·7	102·8	104·2	103·0	102·7	102·2	101·8	102·1	

Thirteen of these animals gave evidence by rise in temperature of the presence of the disease. These were killed on the 24th, and a post-mortem examination made in each case.

1. Cowslip, Durham Cow, $7\frac{1}{2}$ years.—The lungs of this animal were free from disease, but small patches of tubercle were found in the liver, near the surface. A large mass of tubercle, weighing about a pound, was attached to the omentum with other smaller masses adjacent, mesenteric glands enlarged and filled with tubercle. A tuberculous cyst attached to the stomach was also filled with pus-like tubercle. Deposits of tubercle were also found in the udder.

2. Red Rosebud, Durham Cow, $6\frac{1}{2}$ years.—The apex of one of the lungs was filled with cheesy and softer masses of tubercle, the other lung was healthy. There was a tumour in the throat of a part fatty and part fibrous character, inclosing small masses of tubercle, some of which was solidified and some semi-fluid.

3. Nellie Elgins, Durham cow, $3\frac{1}{2}$ years.—Lungs and other organs healthy. Thoracic glands much enlarged and filled with solidified and calcareous tubercle—parts of the udder indicated the presence of tubercle in its early stages.

7. Red Knight, Durham Bull, $3\frac{1}{2}$ years.—Lungs and other organs healthy. No tubercle was found in any of the thoracic or mesenteric glands, but the lymphatic gland on each side of base of scrotum was found charged with tubercle in a semi-fluid condition.

14. Siepkje 3rd's calf, 8 months, Holstein heifer.—In this animal the lungs and liver were healthy, and no tubercle was found in any of the glands. In the udder were found hardened patches of tubercle, and small tubercles were also found on the surface of the spleen.

17. Pride of Eastview, Polled Angus Cow, 8 years.—The lungs appeared to be free from tubercle, but had an unhealthy appearance, the tip of one lobe of the liver was also light coloured and unhealthy looking, not clearly tuberculous, but may have been tubercle in an early stage. The glands were free from tubercle, but tuberculous matter was found on both sides of the udder in patches.

18. Stella of Eastview, Polled Angus Cow, 7 years.—Both lungs were almost filled with masses of soft solidified tubercle. The thoracic glands were much enlarged, weighing about two pounds in all, and were filled with tubercle mostly in a calcareous condition. Small tubercles were found on the surface of the spleen, and the udder had small patches of tubercle on both sides.

19. Daisy of Eaton, Polled Angus Cow, $5\frac{1}{2}$ years.—One small mass of tubercle was found in one of the lungs near the tip, otherwise these organs seemed healthy. The glands were free from tubercle, but a few small tubercles were found on the surface of the spleen.

20. Lady Eaton, Polled Angus Cow, $3\frac{1}{2}$ years.—A large mass of tubercle was found in the substance of one lung, and many smaller masses distributed through the adjacent structure. Several small tubercles were found just under the surface of the liver, also on the surface of the spleen. The thoracic glands were much enlarged and filled with caseous tubercle.

21. Stella of Assiniboia, Polled Angus Cow, 3 years.—The lungs of this animal were healthy, but a small patch of tubercle was found in the liver. Two of the lymphatic glands were also found to be slightly tuberculous. In this cow the disease was in a very early stage.

30. Nellie, Grade heifer, 2 years.—No tubercle was found in the lungs, but the surface had an unhealthy appearance, liver healthy, one of the thoracic glands was enlarged and partly filled with solidified tubercle.

33. Grade Steer, 2 years.—One lump of semi-solid tubercle was found in the substance of one of the lungs about the size of a hen's egg, and three of the thoracic glands were enlarged and partly filled with caseous tubercle.

35. Holstein Grade Steer, 5 months.—In this instance the lungs and other organs were healthy, but the thoracic glands were considerably enlarged and filled with caseous tubercular matter.

In the table it will be seen that the yearling Durham bull, Prince, of Qu'Appelle, No. 8 had a very unusually high normal 104.3, and although this ran up to 104.8 with-

in three hours after the tuberculin was injected it fell so rapidly afterwards to the usual normal that it was evident that the high point reached was not due to the action of the tuberculin. The sudden rise also of 2 degrees which took place in the case of the Polled Angus calf No. 26 within three hours after injection was followed by a rapid fall to the normal so shortly after that it was highly improbable that the rise was caused by the tuberculin. As the mother (Cowslip) of one of the young calves not tested was found to be diseased, the calf also was killed but no evidence of disease was found in it—the mothers of the other two young calves proved to be healthy, and they of course were not slaughtered.

In this instance 10 of the animals destroyed were pure-bred and 3 grades—four were bred at Indian Head and nine sent from Ontario.

EXPERIMENTAL FARM, NAPPAN, N.S.

During the month of August, I visited the branch experimental farm at Nappan, N. S., with the object of testing the cattle there. As mentioned in Bulletin No. 20, p. 31, one case of tuberculosis had occurred there in the summer of 1893 when the suspected animal was killed and on post-mortem examination found to be affected with this disease. Two of the progeny of this cow were tested shortly after with tuberculin, and shown to be free from the disease, and as the remaining animals appeared to be healthy no further steps were taken at that time in testing the herd.

There were 39 animals in the herd on the Nappan Farm, 18 of which were grades, and 21 pure bred. Most of them were in good condition, and apparently healthy. The pure bred animals consisted of the following breeds :

	Cows.	Heifers.	Calves.	Bulls.
Durhams.....	5	2		1
Ayrshires.....	3	1		1
Holsteins.....	3	1	1	1
Jerseys.....	2			

In this investigation I was assisted by Dr. Geo. Townsend, V. S., of New Glasgow, N. S., Dr. Wm. Jakeman, V. S., of Halifax, and Dr. F. G. Hall, V. S., of Amherst, N. S. The normal temperatures of the animals were taken on the evening of August 22nd, and morning of the 23rd The tuberculin was injected at 1 p.m. that day and the temperature taken every three hours after for 18 hours with the results given in the following table :—

TUBERCULIN Tests at Nappan Experimental Farm, Nova Scotia.

Name of Animal.	No. of Minims Injected.	Normal Temperature.		Temperature after injection of Tuberculin, August 23, 10 a.m.									
		Aug. 23.		August 23.			August 24.						
		7 p.m.	8.30 a.m.	1 p.m.	4 p.m.	7 p.m.	10 p.m.	1 a.m.	4 a.m.	7 a.m.			
<i>Durhams.</i>													
1. Isabella VII.....	60	102.1	101.6	102.2	101.4	102.6	101.3	101.2	107.4	101.2	101.2	101.2	101.2
2. Ruena II.....	60	101.6	102.4	102.2	103.0	101.8	102.6	101.6	101.2	101.6	101.2	102.2	102.2
3. Juniper.....	60	101.4	101.2	100.7	101.8	101.2	101.0	101.0	99.6	101.0	101.2	101.2	101.2
4. Fern Duchess.....	65	101.0	102.2	102.8	103.6	103.7	103.2	102.0	101.8	102.0	101.8	101.9	101.9
5. Lady Rose.....	60	101.8	102.0	102.0	102.3	102.5	102.8	101.4	101.0	101.4	101.0	102.4	102.4
6. Bess.....	30	101.5	101.8	102.2	103.2	103.0	102.2	102.0	102.0	102.0	102.0	102.0	102.0
7. Duchess of Nappan.....	30	101.3	101.8	102.3	102.0	103.0	102.4	102.3	101.1	102.3	101.1	101.6	101.6
8. Nappan's Fashion.....	70	101.1	100.0	102.3	101.6	101.8	102.5	104.6	104.6	103.4	103.4	103.4	103.4
<i>Ayrshires.</i>													
9. Daisy Eyebright.....	60	100.6	100.9	101.6	102.0	101.8	101.6	101.2	100.2	101.2	100.2	100.7	100.7
10. Jennie.....	60	100.4	102.7	102.9	102.7	103.2	103.0	102.4	103.6	102.6	103.6	103.3	103.3
11. Pauline.....	60	100.9	102.3	101.8	102.0	102.0	102.3	102.6	101.4	102.6	101.4	102.0	102.0
12. Daisy.....	30	101.9	102.0	102.1	102.2	101.9	101.6	101.4	101.5	101.4	101.5	100.6	100.6
13. Rob Roy.....	65	.....	101.7	101.8	101.6	101.6	101.2	100.8	100.8	101.0	100.8	101.0	101.0
<i>Holsteins.</i>													
14. Minnie Rooker.....	60	101.4	102.0	102.3	101.4	101.8	102.4	101.0	101.0	101.4	101.0	101.4	101.4
15. Dorinda, of Ottawa.....	55	101.3	102.3	102.2	102.4	102.6	102.6	102.0	102.1	102.0	102.1	102.0	102.0
16. Ida Rooker.....	40	101.2	103.5	101.8	102.4	102.9	101.8	101.0	101.4	101.0	101.4	103.2	103.2
17. Dorinda, of Nappan.....	20	102.4	102.1	101.4	101.7	102.2	102.0	101.9	102.1	101.9	102.1	101.6	101.6
18. Eva Rooker.....	20	103.0	102.9	103.6	102.7	102.8	102.6	102.6	102.0	102.6	102.0	102.0	102.0
19. Netherlands Clothilde.....	70	100.5	102.0	101.6	101.1	101.0	100.4	101.6	100.1	101.6	100.1	100.6	100.6
<i>Jerseys.</i>													
20. Kate Remona.....	60	100.8	101.2	101.2	101.9	103.0	102.6	103.0	102.3	102.8	102.3	102.8	102.8
21. Macleod.....	50	101.6	102.3	101.4	101.4	101.1	100.9	101.1	101.4	101.1	101.4	100.8	100.8
<i>Grades.</i>													
22. Old Tingley, Durham grade.....	60	101.6	102.2	102.9	103.6	104.3	103.3	102.6	101.8	102.6	101.8	102.3	102.3
23. Marion, Guernsey grade.....	60	100.9	101.2	102.0	102.7	101.9	101.5	101.0	99.8	101.0	99.8	101.0	101.0
24. Brindle.....	60	101.2	102.2	102.2	101.4	101.8	102.6	100.2	101.2	101.2	101.2	101.2	101.2
25. Tilly.....	60	101.4	101.3	102.0	101.7	102.0	99.8	101.6	101.6	101.6	101.6	100.4	100.4
26. Susie.....	60	102.5	101.8	102.0	102.0	102.6	102.5	103.7	103.4	104.0	103.4	104.0	104.0

TUBERCULIN Tests at Nappan Experimental Farm, Nova Scotia—Concluded.

Name of Animal.	No. of Minims Injected.	Normal Temperature.		Temperature after injection of Tuberculin, August 23, 10 a.m.									
		Aug. 22.		August 23.									
		Aug. 22.	Aug. 23.	7 p.m.	8.30 a.m.	1 p.m.	4 p.m.	7 p.m.	10 p.m.	1 a.m.	4 a.m.	7 a.m.	
<i>Grades—Continued.</i>													
27. Tingley, jun., Ayrshire grade.....	60	102.2	102.2	102.2	102.5	102.4	102.0	101.2	101.4	102.0			
28. Mary, Durham grade.....	50	101.4	101.4	101.8	102.2	103.0	102.3	101.6	100.6	101.6			
29. Juno.....	50	101.5	101.9	102.3	102.1	102.8	102.3	101.8	101.3	101.8			
30. Rose.....	50	100.5	102.2	102.5	101.6	102.6	102.0	101.0	101.0	100.7			
31. Reed.....	40	102.0	102.1	102.2	101.9	102.6	102.0	101.0	100.8	102.0			
32. Molley.....	30	102.4	101.8	102.0	102.3	103.9	103.1	101.8	102.0	102.0			
33. Julia.....	30	103.0	102.1	102.4	102.8	103.8	103.4	103.1	102.0	102.0			
34. Sally.....	30	101.8	102.8	102.8	103.0	103.3	103.0	101.5	102.0	102.1			
35. Maggie.....	30	102.1	102.4	102.8	102.7	103.3	102.7	102.2	102.4	102.5			
36. Topsy.....	20	103.2	102.3	102.6	102.9	101.6	102.0	101.9	100.8	100.6			
37. Wild Eyes.....	40	102.0	102.1	102.7	102.6	103.0	102.8	103.1	104.6	103.8			
38. Tom.....	20	103.2	102.3	102.6	102.9	101.6	102.0	101.9	100.8	100.6			
39. Dick.....	20	103.0	102.9	103.6	102.7	102.8	102.6	102.6	102.0	102.0			

In this instance ten of the animals gave evidence of the presence of the disease. These were killed on the 24th and the particulars of their condition are given in the following notes, taken at the several post-mortem examinations.

4. Fern Duchess, Durham cow.—In this animal the lungs were healthy, so also were the glands. A large tubercular deposit was found on the sternum, measuring about 7 inches by 5 and 2 inches deep. The muscular tissue being filled with tubercle, some of it pus like, some caseous. This patch extended from the bone upwards to within about $1\frac{1}{2}$ inches of the skin. There was no appearance of bruise or other injury on the surface. There was an indurated tumour in one of the teats containing caseous tubercle. Small lumps of tubercle were also found between the serous and mucous walls of the intestines.

6. Bess, Durham heifer, 1 year.—The lungs of this animal were healthy. One of the thoracic glands was considerably enlarged and filled with tubercle, and several others were diseased but less affected. The intestinal walls were dotted with tubercles of various sizes, most of them filled with material of a cheesy consistence.

7.—Duchess of Nappan, Durham heifer, 1 year.—This animal was not in good condition, and was evidently ailing; her right lung was found to be in a condition of atrophy and much wasted, its surface was covered with small tuberculous pustules, the left lung was better developed, but similarly covered with pustules. The intestinal walls were also studded with tubercular deposits of a granular character.

8. Nappan's Fashion, Durham bull, 4 years.—In this case there was found distributed through the substance of one of the lungs a considerable number of small masses of caseous tubercle, the other lung appeared to be healthy. One of the thoracic glands was much enlarged and filled with caseous tubercle, and several other glands in the thoracic cavity were found filled with tubercle, either cheesy or pus-like but in less quantity.

20. Kate Remona, Jersey cow, 5 years.—In different portions of the substance of both lungs, lumps of tubercle were found in a caseous condition, one lung was found adhering to the side. The thoracic glands were much enlarged, indurated and packed with caseous tubercle, and one of the mesenteric glands was similarly affected. Small lumps of tubercle were imbedded in the muscular tissue of the intestines, the inner part of the placenta was also dotted with pustules of tubercle.

22. Old Tingley, Durham grade, 10 years.—In this animal the lungs and other organs were found healthy and no tuberculous deposit could be detected in any of the glands. Small nodules of tubercle in a caseous condition were lodged under the serous coat of the intestines and distributed in varying proportion all over the large and small intestines.

26. Susie, Guernsey grade cow, 6 years.—Lungs healthy, no deposit found in thoracic glands. Mesenteric glands partly filled with caseous tubercle. Small masses of tubercle attached to the surface of the liver, uterus and intestines.

28. Mary, Durham grade cow, 3 years.—Both lungs dotted with tubercular matter in its earlier stages, small deposits of tubercle were also found in the substance of the liver. Inguinal glands slightly tuberculous, the interior walls of the uterus had also patches of tubercle.

32.—Molly, Durham grade heifer, 1 year.—The tip of one lung for about 5 inches was indurated and filled with tubercle in its early stages. No evidence of the presence of tubercle was found in any of the other organs or glands nor about the intestines.

37. Wild Eyes, grade steer, 2 years.—This animal was in poor condition. No evidence of tubercle was detected in the lungs, liver or other organs or glands of the body excepting in one of the mesenteric glands, in which tuberculous matter was found, small masses of tubercle were also found attached to the mesentery.

In this series of tests it will be observed that the temperatures on which some animals were condemned are lower than some other cases where no action was taken. There was, however, in every instance, where slaughter took place, $1\frac{1}{2}$ degrees or more Fahrenheit of increase above the average normal temperature, except in the case of Duchess of Nappan No. 7, a yearling Durham heifer, which was not thrifty and appeared to be suffering from some internal trouble. She was killed on a rise in temperature

of 145 degrees above her average normal and the condition of the organs on post-mortem justified this action. The case of Jennie No. 10, an Ayreshire cow, was suspicious but her temperature varied considerably at different times during the test, which, at the highest, was but nine-tenths of a degree above the highest normal. As there were other reasons which might account for these fluctuations in her case, she has been left over for a second test.

Of the ten animals destroyed five were grades and five pure bred. One of the pure bred animals was sent from Ontario, one was purchased in New Brunswick, and of the remainder, including the grades, some were raised at the Nappan farm and the others bought from farmers in Nova Scotia.

EXPERIMENTAL FARM, AGASSIZ.

On the 13th of September, 1894, I arrived at Agassiz, B. C., and proceeded to test the cattle there, which numbered 18 head, 2 of which were grade animals and 16 pure bred. The pure bred animals consisted of the following breeds.

	Cows.	Heifers.	Calves.	Bulls.
Durhams.....	2	2	—	1
Ayrshires.....	2	2	1	2
Holsteins.....	2	—	—	2

The preliminary tests of normal temperature were completed on the morning of September 14th, and the tuberculin injected at 1 p.m. on the same day. The temperature was subsequently taken every 3 hours for 21 hours with the results given in the appended table.

TUBERCULIN Tests at Agassiz Experimental Farm, British Columbia.

Name of Animal.	No. of Minims injected.	Normal Temperature.		Temperature after injection of Tuberculin, September 14, 1 p.m.							
		September 14.		September 15.							
		9 a.m.	11.30 a.m.	4 p.m.	7 p.m.	10 p.m.	1 a.m.	4 a.m.	7 a.m.	10 a.m.	
<i>Durhams.</i>											
1. May Gwynne.....	60	101.1	101.3	101.2	101.8	102.8	105.2	104.7	104.0	103.2	
2. Cheam Gwynne.....	55	101.2	101.5	100.7	101.8	101.5	104.0	104.2	104.9	104.8	
3. Maid of Cheam.....	55	102.0	101.2	101.0	101.8	101.3	100.2	100.8	106.9	101.1	
4. Daisy.....	40	101.2	101.0	101.3	101.7	102.4	101.5	101.8	100.7	101.1	
5. Durham.....	60	101.9	102.2	102.0	102.0	103.5	105.1	105.5	105.5	105.2	
<i>Ayrshires.</i>											
6. Violet.....	55	101.2	101.8	101.8	102.0	101.6	101.3	103.2	102.8	102.2	
7. Gipsy.....	55	101.4	101.8	101.2	100.7	100.8	98.0	101.2	100.5	100.8	
8. Gipsy Queen.....	50	101.3	101.7	102.1	102.0	101.8	102.0	101.2	101.2	100.8	
9. Susan.....	30	101.5	101.5	102.0	102.0	102.1	102.2	102.0	101.6	101.6	
10. Ayrshire calf.....	15	.....	102.1	102.3	102.8	101.6	102.3	101.9	101.1	101.8
11. Prince of Carleton.....	60	101.2	101.6	100.2	101.0	100.7	100.2	100.8	100.9	100.8	
12. Valley Chief.....	35	101.2	102.0	101.6	101.4	100.4	100.2	100.3	100.8	102.0	
<i>Holsteins.</i>											
13. Holstein, No. 68.....	60	101.7	101.6	101.8	101.2	100.8	101.0	100.8	100.7	101.4	
14. Maid of Chlothilde.....	55	101.4	101.8	101.6	101.8	101.2	100.2	101.2	101.7	101.4	
15. Netherland Prince.....	60	101.0	101.1	101.2	100.9	100.5	102.2	103.6	103.4	102.1	
16. Chlothilde's 2nd Artis.....	35	101.6	101.2	100.5	101.4	100.8	100.3	100.4	100.8	101.2	
<i>Grades.</i>											
17. Myrtle, grade cow.....	60	101.0	99.6	101.2	101.4	100.8	100.8	100.4	100.6	101.0	
18. Dick, grade steer... 1 year.	30	.....	101.6	102.3	101.8	101.0	101.0	100.0	101.1	100.8

From the figures in the table, it will be seen that five of the animals showed a sufficient increase in temperature to justify the opinion that they were diseased. These were killed on the following day, and on post-mortem examination all were found to be tuberculous. In two of them the disease was in an advanced condition, in the other three it was in its earlier stages.

1. May Gwynne, Durham Cow, 9 years.—The entire interior surface of thorax and abdomen was covered with granular grapy tubercular deposit, the lining of the diaphragm, the bowels, the entire surface of the lungs and nearly the whole surface of the liver was similarly covered. The substance of both lungs was full of patches and lumps of tubercle, most of which was in a caseous condition. The thoracic and mesenteric glands were all considerably affected and contained caseous tubercle. Spots of tuberculous matter were also freely distributed over both large and small intestines. There was no evidence of tubercle in the udder. This was the worst case of the disease I have ever met with.

2. Cheam Gwynne, Durham Cow, 4 years.—Several patches of tuberculous matter were found at the tips of both lungs. There were three small spots also on the liver, one of which extended below the surface for nearly one inch. The thoracic and mesenteric glands were free from disease, but one of the salivary glands was slightly affected with tubercle, there were also a few tubercular pustules on the intestines. The udder was healthy.

5. Durham Bull, 3½ years.—The lungs showed no evidence of disease, but there were two small patches of incipient tubercle on one lobe of the liver near the tip. One of the thoracic glands was very much enlarged and filled with tuberculous matter partly of a cheesy consistence and partly calcareous. There was a small tumour under the skin of rump which contained small patches of tubercle in its earlier stages.

6. Violet, Ayrshire Cow, 6 years.—The tip of one lobe of the lungs had a lump of caseous tubercle imbedded in the tissues about the size of a walnut, otherwise the lungs appeared to be healthy. One of the mesenteric glands was found enlarged and filled with caseous tubercle.

15. Netherland Prince, Holstein Bull, 3½ years.—No tubercle was found in the lungs. One of the thoracic glands was slightly tuberculous, and there were a few warty tuberculous patches on the surface of the spleen. The inner lining of the diaphragm was coated with tubercular pustules, and on opening the liver a large abscess was found containing about half a pint of creamy white tuberculous matter. The liver was also grown to the side and to some of the adjacent organs.

The five animals destroyed were all pure bred, three of them had been sent from Ontario, and two from Manitoba.

RELIABILITY OF TUBERCULIN AS AN INDICATOR.

Including the animals reported on in Bulletin 20, opportunity has now been given to test the reliability of the indications of tuberculin in connection with the experimental farm work in 74 cases, in each one of which—excepting the doubtful case reported on in Bulletin 20, p. 28—the existence of the disease as indicated by the rise in temperature has been demonstrated.

TUBERCULOSIS SHOULD NOT BE CONFOUNDED WITH PLEURO PNEUMONIA.

It is most unfortunate that so many intelligent people in the community, including some members of the press, fail to realize that tuberculosis is a disease entirely distinct from pleuro pneumonia. Pleuro pneumonia is a terribly contagious disease which when once established in a herd carries its victims off suddenly and rapidly, while tuberculosis, although contagious, is usually very slow in its workings, and an animal may have the disease for years without its being manifested by any external symptoms.

Pleuro pneumonia is essentially a lung disease under the influence of which the lungs become rapidly congested and very shortly lose the power of discharging their natural functions, and the animal dies.

Tuberculosis is not essentially a lung disease. Out of the 74 cases of post-mortem examination referred to, in 26 of them or more than one-third of the whole no disease whatever could be detected in the lungs, nor were their functions interfered with in any way, the disease in this large proportion of cases being confined to some of the other organs or glands of the body.

The distinctness of character between these two diseases should always be borne in mind. Tuberculosis is identical with the disease known as consumption in the human family, and exists among cattle to a greater or less extent it is said in every country where they are kept in a state of domestication. Whereas pleuro pneumonia happily is much less prevalent and is not known to exist anywhere in Canada.

VISITORS TO THE CENTRAL FARM.

During 1894 a large number of farmers have visited the Central Farm. In addition to the daily visits of individuals and small groups, special excursions were organized from different points within a radius of from 100 to 200 miles both in Ontario and Quebec under the auspices of farmers' institutes, and agricultural societies and circles. Many took advantage of the low rates offered by the railway companies, and visited the farm and inspected the different branches of work in progress here. On most of such occasions opportunities were given for some of the officers of the farm to address the assembly, and give such information regarding the organization and arrangement of the work on the farm also as to the location of objects of special interest, as would enable the visitors to make the best possible use of the limited time afforded them: and all the members of the farm staff available have on such occasions devoted their whole time to the visiting friends. These efforts have been much appreciated, the visitors going away well pleased with the information gained. During the summer a number of seats have been provided and distributed over the grounds, under the shade of trees or among groups of shrubbery for the convenience of visitors. The number of visitors to the farm during the year has been about twelve thousand.

MEETINGS ATTENDED.

During the year the following important meetings of a representative or provincial character have been attended, and large audiences addressed:—

On December 6th and 7th, 1893, the annual meeting of the Fruit Growers Association for the province of Ontario, held at Peterboro', Ont., where I presented a paper on "Some desirable ornamental trees, shrubs and plants for cultivation in Ontario."

On the 16th and 17th of January, 1894, the annual meeting of the Fruit Growers' Association of Nova Scotia was attended at Wolfville, Nova Scotia, where addresses were given on "The life history of an apple tree—what an orchard takes from the soil, and how this may be restored;" also, on "Results of fruit tests on the Experimental Farms."

On February 21st and 22nd, the annual meeting of the Dairymen's Association of New Brunswick, held at Fredericton, N.B., where addresses were delivered on "Soils, and how to maintain their fertility;" also, on "The growing of vegetables and fruits by the farmer for his family."

On the 23rd and 24th of the same month the annual meeting of the Dairymen's Association of Nova Scotia was attended at Kentville, N.S., and addresses delivered on some of the results of the work of the experimental farms in the interests of agriculture.

The annual meeting of the Central Farmers' Institute of Manitoba was attended at Brandon, Manitoba, on July 17th, 18th and 19th, and addresses delivered on the "Benefits conferred on the farmer by the work of the experimental farms;" also, in reference to "Agricultural education."

In August the annual meeting of the Society for the Promotion of Agricultural Science was attended on the 14th and 15th in Brooklyn, N. Y., where, as president of

the society I delivered an address containing a summary of the methods adopted by the Government of Canada for the promotion of agriculture.

I also attended the meeting of the agricultural conference held in Truro, N. S., in August in connection with the visit of their Excellencies the Governor General and the Countess of Aberdeen, and took part in the proceedings.

VISITS TO THE BRANCH EXPERIMENTAL FARMS.

Two visits have been paid this season to the branch experimental farms at Brandon and Indian Head and one each to Nappan and Agassiz. The first trip was made in July, and the second during the month of September.

EXPERIMENTAL FARM AT BRANDON, MAN.

At the time of the earlier visit, July 17th to 20th, the crops were suffering much from a protracted drought, the straw of the grain was very short and the yield did not promise well. Subsequently, the results of the harvest proved better than had been expected. The yield was not large, although better than last year, but the quality of the grain was excellent. The Indian corn looked well, but the roots and other late crops had suffered much, from the long continued dry weather. The avenues, belts and hedges of forest trees looked well and had made good growth notwithstanding the unfavourable season.

This farm is proving a most useful institution to the farmers of Manitoba, and kind words of appreciation and commendation are heard on every hand in regard to the suitability of the location, the value of the experimental work planned, and the excellent way in which the farm is conducted by the much esteemed superintendent.

The grading and planting of the groups of shrubs and ornamental trees about the residence of the superintendent briefly referred to in my last annual report, together with the subsequent sodding, had produced a most marked improvement in the surroundings and had transformed a bare and barren looking place into a fertile looking and beautiful spot dotted with thrifty growing trees and shrubs, affording in all directions pleasant objects for the eye to rest upon. Provision is being made to add to this interesting collection of trees and shrubs during the coming season.

EXPERIMENTAL FARM AT INDIAN HEAD, N. W. T.

Crops suffered in a still greater degree from the excessive dry weather in the North-west Territories, and those at Indian head were no exception to the general rule. The good results of summer fallowing and good farming were very apparent during this visit, for, while the crop on the Indian Head experimental farm was reduced to about one half of the average return, those farmers in the neighbourhood who had not followed the good example set by our efficient superintendent, Mr. A. Mackay, had scarcely any crop worth cutting. The wind-breaks and belts of forest trees which have been planted on this farm are now rapidly transforming it from a bare plain to a piece of attractive and diversified landscape. Their great usefulness in collecting snow during the winter and thus giving more moisture to the land has also been clearly demonstrated in the increased yields of grain and roots obtained on land adjacent to such plantations, for particulars of which I would refer the reader to the excellent report of the superintendent of that farm appended.

The train service during the greater part of the year has not been convenient for visitors to the farm, the trains passing Indian Head each way during the night. For this reason the number of visitors to the farm has not increased as it undoubtedly would have done under more favourable circumstances.

EXPERIMENTAL FARM AT NAPPAN, N.S.

This branch farm was visited in August, when the work in progress there was carefully inspected. The hay crop had been large and was well saved, but the protracted

dry weather which followed the hay harvest had resulted in a short growth of straw in cereal crops and in many instances lessened the yield. In quality, however, the grain is usually good, the kernel being plump and well developed. Most of the other crops on the experimental farm had given or at that time gave promise of satisfactory returns. For particulars in regard to these and other interesting points the reader is referred to the report of the superintendent of that farm appended.

The fruit orchard had made satisfactory progress and many of the young apple trees were bearing, some of the plums and cherries had also borne fruit. A new line of experimental work in the tile draining of marsh land was begun this year which it is hoped will prove advantageous. The general progress made in the improvement of the land and the condition in which the buildings, implements and stock were kept was very satisfactory and creditable to the superintendent in charge.

SECOND VISIT TO THE WEST.

In travelling westward for the second journey, the route to the Pacific by the "Soo" line was chosen in order to gain an opportunity of visiting the Experimental stations in Minnesota and South Dakota, U.S.

MINNESOTA EXPERIMENT STATION.

The Minnesota Station at St. Anthony's Park, Minneapolis, was inspected on the 4th and 5th of September, when I was most courteously received by Prof. W. M. Hays, the officer in charge, also by Prof. S. B. Green, who has charge of the horticultural and botanical departments and by the other officers of the station who all did everything in their power to make my visit pleasant. It was a source of much regret to me that Prof. Thos. Shaw, late of Guelph, now a highly esteemed member of the staff of this institution, was unavoidably absent during the time of my visit.

There are 250 acres of land belonging to the Minnesota experiment station, about 100 acres of which are laid out in experimental plots for grain, corn, fodder plants, &c. The grain crops had all been cut before my arrival, but the yields were reported as small on account of the drought. The corn and other late crops remaining were all very much stunted and parched. The experiments planned here are of a very practical character and promise to be very useful to the farmers of the state. The land is well situated and appeared to be of good quality, and in ordinary seasons would no doubt give satisfactory returns. The area devoted to experiments with fruits and economic and ornamental trees and shrubs was large. Many promising varieties, especially of plums were seen in fruit and opportunities afforded of testing their respective merits as grown in this climate. Much useful information was also gained from the tests in progress with some of the hardy Russian apples and with the hardier forms of trees and shrubs.

On Sept. 6th I left Minneapolis for Brookings, South Dakota. On the route through South Dakota as well as after arrival at Brookings, it was everywhere evident that the effects of the dry season had been felt most severely, the crops had all been very much stunted and had ripened prematurely. Many of the fields of grain had been left uncut and the straw was very short, in some instances not more than 8 or 10 inches high with very small and partly developed heads, some of the best of these fields were being cut with a mower as the material was too short to use a binder, and the heads were raked into heaps and hauled to the thresher, but it is a question whether the yield thus obtained, at the low prices prevailing, would pay for the extra labour involved. With so little straw and a very light crop of hay, the prospects for wintering stock were very discouraging to many farmers.

The Experiment station and agricultural college grounds at Brookings, which consist of about 400 acres, are nicely located on a piece of high rolling prairie. The officers at the station were all very courteous and gladly gave me all the information at their command. Under the guidance of Prof. L. C. Corbett, who has charge of the fruit and

forest plantations, I visited the forest tree belts, which were very instructive, as they had been planted about 10 years and thus afforded opportunities of comparison with the growth of similar trees more recently planted at Indian Head and Brandon. Prof. Chilcott, the agriculturist, drove me over the lands devoted to agricultural experiments. The chemist, Prof. J. H. Shepard, kindly conducted me through the laboratory and submitted samples of the waters from artesian wells in various parts of the state which he had collected for the purpose of analysis. Prof. T. A. Williams, the Botanist and Entomologist, also gave me much information regarding the plants and shrubs, hardy in this part of South Dakota, and assisted me in collecting seeds of some of the most promising sorts for test in Canada. I left on the following day for the west, much pleased with the information gained.

That formidable weed known as Russian thistle was very common over a large area in both the Dakotas and where farms have been abandoned after partial breaking or where fields have been neglected this weed was observed in great abundance.

On the way to Moose Jaw, a day was spent at Estevan, N.W.T., where some of the recently opened coal seams were visited. The supply of this material in that locality is most abundant and the quality seems to be that of a very good lignite.

Arrangements had been made that Mr. A. Mackay, the Superintendent of the Experimental Farm at Indian Head, should join me in this journey to the Pacific coast, and from Moose Jaw we travelled together to Agassiz where we arrived September 13th.

EXPERIMENTAL FARM, AGASSIZ.

Satisfactory progress had been made with the work on this branch farm. The young orchards were bearing fruit, and the plums, which were just in their prime, were of excellent quality and yielding well; a considerable number of the young apple trees had also come into bearing. There are now more than 1,200 varieties of fruit under test at this farm. The experiments in planting on the higher bench lands on the sides of the mountains are proving very successful, the young fruit trees coming earlier into leaf there than those planted in the orchards in the valley. These experiments are of great importance to the province for these patches of land on the hill sides are of little or no value for general agricultural purposes, and if they can be advantageously turned into fruit orchards, it will give a great impetus to fruit growing in British Columbia, as the quantity of such land available is very large. The plantations of hard wood forest trees on the mountain sides have been enlarged during the past year, and in a few years it will be demonstrated whether such valuable eastern hard woods as the black walnut, cherry, hickory, oak, elm, ash and maple can be grown here to advantage. With all its wealth of timber, British Columbia has very little hard wood, and the successful cultivation of these valuable eastern trees in that province would no doubt eventually prove a great boon. The unusual spring floods which did so much injury to the crops in the lower lands in the valley of the Fraser did not reach the Experimental Farm. The grain and hay had given good returns, and the root crops promised well. The arrangements for supplying the barn and dwelling with spring water from the mountain were nearly completed, a considerable area of new land had been cleared and broken up, and the general advancement made in all departments was most creditable, showing that the energy and push which the efficient superintendent has shown from the first has not abated.

While on the coast a visit was paid to the Chilliwack and Sumas districts on the south side of the river, where the effects of the spring flood were more severely felt. On the lower lands which had been covered with water for several weeks the submerged grain crops had been destroyed, but as soon as possible after the waters had subsided, many of the fields were resown, but the season was too far advanced to admit of the ripening of the grain. At the time of my visit it was in head and was being cut and cured for fodder.

In the orchards which had been flooded a large proportion of the cherry trees had been killed. It was also observed that many of the trees in the young plantations of plums, pears and apples which had been overflowed, were dead, but in most instances

the older and well established trees did not appear to have suffered permanent injury. This will not, however, materially affect the general fruit interests of the province for the reason that a large proportion of the orchards newly planted are on highground. The settlers have shown a most praiseworthy degree of energy in their endeavours to repair the damage done, and this part of the country will no doubt soon resume its wonted appearance of luxuriant fertility.

VISIT TO CALGARY.

On the return journey a day was spent at Calgary where the irrigation ditch and flume recently constructed by Mr. G. Alexander was visited and examined. The water had been turned on the day previous and was flowing through the channels provided for it over a large area of land. The ditch which takes the water from the other side of Bow River is about five miles long, and the flume which carries the water across the river on a substantial bridge is barrel-shaped, three feet in diameter and has a length of 2,000 feet. This water supply will now be available, it is said, for the irrigating of 2,000 acres of land on the plains near Calgary and with some further extension of the work it is believed that this area can be doubled and 4,000 acres sufficiently supplied with water from this ditch. Other irrigation ditches are in progress of construction in that district and the results of the crops of next season under these favourable conditions as to moisture will be watched with great interest.

SECOND INSPECTION OF BRANCH FARMS AT INDIAN HEAD AND BRANDON.

Continuing eastward the farms at Indian Head and Brandon were again inspected. The grain crops at Indian Head had been harvested, but on account of the drought the yield had fallen considerably short of that of previous years. The fields and plots at that time threshed of wheat, varied from 15 to 22 bushels per acre and other cereals in proportion. North of Indian Head where on some farms local showers were had during the critical period of growth the yield has ranged from 20 to 30 bushels per acre, while south and west of the town and in other districts not favoured with local showers the yields of grain have been very light, averaging much less than those realized on the experimental farm.

At the Experimental Farm at Brandon, the yields of all sorts of grain had been more satisfactory, and better than was expected at the time of my visit in July. Wheat on the Experimental Farm was turning out from 22 to 30 bushels per acre and oats and barley in proportion. An encouraging feature in connection with the crop this year throughout the west is the unusually fine quality of the grain produced.

CORRESPONDENCE.

The following is a summary of the letters received and despatched at the Central Experimental Farm from November 30th, 1893, to November 30th, 1894, also of the bulletins and reports distributed by mail during the same period.

	Letters received.	Letters sent.
Director.....	9,325	6,076
Dairy Commissioner and Agriculturist....	4,768	5,236
Horticulturist..	1,668	1,912
Chemist	1,297	1,171
Entomologist and Botanist.....	2,362	2,251
Poultry manager.....	1,118	966
Accountant.....	1,276	1,039
	21,814	18,651

CIRCULAR LETTERS SENT.

The larger part of these are instructions sent with samples of seed-grain, tree seeds, &c., distributed.....	29,695
Number of reports and bulletins mailed.....	141,537

ACKNOWLEDGMENTS.

I desire on this occasion again to express my obligations to all the officers of the several Experimental Farms for their diligence and cordial co-operation in carrying out the measures which have been planned in connection with their several departments and for the earnest interest they have taken in the successful prosecution of their several branches of work. Where all have done so well special acknowledgments may seem unnecessary. A personal acknowledgment is, however, specially due to those members of the staff, who have so ably aided me in those sections of the work of which from the beginning I have assumed the personal charge ; also for the assistance I have received in carrying on portions of the agricultural work, specially arranged for with the agriculturist. To Mr. John Fixter, the farm foreman, to Mr. W. T. Macoun, the foreman in forestry, who has also acted as my assistant in the experimental field work, to Mr. W. T. Ellis, who has had charge of the seed testing and propagating houses, and to Mr. J. Kirkpatrick, who has carried on the work of seed distribution, my grateful thanks are due for the assiduous care they have shown in carrying out these several divisions of the work, and in collecting and preserving the data which forms the basis of much of the information presented in this respect.

WM. SAUNDERS,

Director, Dominion Experimental Farms.

REPORT OF THE AGRICULTURIST.

(JAS. W. ROBERTSON.)

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms.
Ottawa.

SIR,—I have the honour to present reports on, (1) experiments in the feeding of swine, (2) work in the experimental dairy and (3) the 40-acre lot.

Experiments were begun in the fattening of two lots of steers on a ration of which the bulky-fodder portion was mainly corn ensilage, to be compared with a ration of which the bulky-fodder portion was mainly the Robertson Mixture ensilage, composed of Indian corn, horse beans and sunflower heads. Feeding experiments along similar lines were begun with milking cows. Enough information has not yet been obtained to warrant the publication of any conclusions from these tests, which are still in progress.

As in former years, my duties and opportunities as Dairy Commissioner received the greatest part of my time and labour. Executive and commercial work in connection with the establishment and management of the Branch Experimental Dairy Stations has taken me much from home. There were within the year 23 Dairy Stations and 2 Dairy Schools, besides 3 Travelling Dairies, under my charge.

The supervision of the major part of the Agriculturist's work, viz., the grain and root crops, was taken by yourself as heretofore.

I am indebted to Mr. John Fixter, farm foreman, Mr. R. R. Elliott, herdsman, and Mr. Chr. Marker, butter-maker, for particularly painstaking assistance in the work reported upon.

I have the honour to be, sir,

Your obedient servant,

JAS. W. ROBERTSON,

Agriculturist.

PART I.—THE FEEDING OF SWINE.

Experiments in the feeding of swine were continued during 1894, to gain information on the quantities of feed consumed per pound of increase, in the live weight of swine of different breeds or breeding.

Incidentally some information was gained on the relative quantities of grain and skim-milk required to produce one pound of increase in live weight.

Tests were begun to discover whether the feeding of wheat and of buckwheat resulted in the production of meat of a soft and inferior quality.

FIRST SERIES.

This series of tests was a continuation of those reported as *third series* in the annual report of 1893.

In 1893 the swine in this test were fed until December 6 on a mixture, composed of equal parts (by measure) of barley, rye, frosted wheat (all ground) and wheat bran, fed after being soaked in cold water for 8 and 18 hours.

From December 6 until the end of the test, the swine in **seven pens** were fed on the same mixture, soaked in cold water, for an average period of 18 hours, plus 3 pounds of skim-milk per head per day.

TABLE I.

Pen No. 2 contained 2 swine, crossbred by **Berkshire** sire and **Tamworth** dam. (Farrowed May 7, 1893.)

	Dec. 6.	Jan. 3.	Jan 31.	Feb. 28.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	346	438	510	550	.....
Increase in weight.		92	72	40	204
Feed consumed. { meal.....		264	258	248	770
+ milk.....		164	168	168	500
do per lb. of increase in live weight. { meal.....		2·86	3·58	6·20	3·77
+ milk.....		1·78	2·33	4·20	2·45

TABLE II.

Pen No. 3 contained 5 swine, crossbred by **Berkshire** sire and **Improved Large Yorkshire** dam. (Farrowed June 6, 1893.)

	Dec. 6.	Jan. 3.	Jan 31.	Feb. 28.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	544	736	947	1,119	.....
Increase in weight.....		192	211	172	575
Feed consumed..... { meal.....		475	686	621	1,782
+ milk.....		410	420	420	1,250
do per lb. of increase in live weight. { meal.....		2·47	3·25	3·61	3·09
+ milk.....		2·13	1·99	2·44	2·17

TABLE III.

Pen No. 4 contained 5 swine, crossbred by Improved Large Yorkshire sire and Berkshire dam. (Farrowed June 9, 1893.)

	Dec. 6.	Jan. 3.	Jan. 31.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	430	565	753	.....
Increase in weight.....		135	188	323
Feed consumed.....		300	517	817
		410	420	830
do per lb. of increase in live weight.....		2.22	2.75	2.52
		3.03	2.23	2.56

TABLE IV.

Pen No. 5 contained 5 swine, crossbred by Essex sire and Improved Large Yorkshire dam. (Farrowed May 31, 1893.)

	Dec. 6.	Jan. 3.	Jan. 31.	Feb. 28.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	417	590	763	911	.....
Increase in weight.....		173	173	148	494
Feed consumed.....		416	596	587	1,599
		410	420	420	1,250
do per lb. of increase in live weight.....		2.40	3.44	3.95	3.23
		2.36	2.42	2.83	2.53

TABLE V.

Pen No. 6 contained 5 swine, crossbred by Essex sire and Improved Large Yorkshire dam. (Farrowed May 31, 1893 ; same litter as in pen No. 5.)

	Dec. 6.	Jan. 3.	Jan. 31.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	490	655	847	.....
Increase in weight.....		165	192	357
Feed consumed.....		426	605	1,031
		410	420	830
do per lb. of increase in live weight.....		2.58	3.15	2.88
		2.48	2.18	2.32

Table IX. shows the quantity of a mixture of equal parts by weight of barley and frosted wheat, both ground and soaked in cold water for an average period of 30 hours, plus pulped carrots, consumed by swine of different breeding per pound of increase in live weight. They were fed for a period of 12 weeks (Feb. 7 or 14 to May 2 or 9) as reported at pages 73-74, Experimental Farms Report, 1893.

TABLE IX.

No. of Swine.	Breeding.	Date of Birth.	Average of live weight per head.		Feed consumed per lb. of increase.	
			Feb. 7 or 14.	May 2 or 9.	Grain +	Carrots.
		1892.	Lbs.	Lbs.	Lbs.	Lbs.
6 Crossbreds....	Improved Large Yorkshire sire and Essex dam	Sept. 23.....	70	134	3.77	0.76
3 Purebreds....	Berkshire	Sept. 24.....	117	186	4.17	0.76
4 Crossbreds....	Improved Large Yorkshire sire and Poland China dam..	Aug. 3.....	119	189	4.42	0.89
4 Purebreds....	Tamworth.....	Aug. 30.....	114	172	4.74	0.86
4 do	Improved Large Yorkshire.....	{ 2, May 17..... } 2, Aug. 4.....	189	236	5.83	1.06

Table X. shows the quantity of a mixture composed of equal parts by measure of barley, rye, frosted wheat (all ground) and wheat bran, soaked in cold water for an average period of 8 or 18 hours, consumed per pound of increase in live weight by swine of different breeding. Some of them were fed for a period of 15 weeks (August 23 to December 6), and some of them for a period of 12 weeks (September 6 to November 29), as reported at pages 75 and 76, Experimental Farms Report, 1893.

TABLE X.

No. of Swine.	Breeding.	Date of Birth.	Average of live weight per head.		Feed consumed per lb. of increase.
			Aug. 23.	Dec. 6.	
		1893.	Lbs.	Lbs.	Lbs.
5 Crossbreds..	Improved Large Yorkshire sire, and Berkshire dam.....	June 9.....	42	86	3.62
5 do	Berkshire sire, and Improved Large Yorkshire dam.....	June 6.....	49	108	3.72
5 do	Essex sire, and Improved Large Yorkshire dam.....	May 31.....	45	98	3.73
2 do	Berkshire sire, and Tamworth dam...	May 7.....	94	173	4.03
5 do	Berkshire sire, and Poland China dam.	Apl. 27.....	83	161	4.11
5 do	Essex sire, and Improved Large Yorkshire dam.....	May 31....	41	83	4.27
4 Grades.....	Tamworth sire, and Berkshire grade dam.....	Sept. 6.	Nov. 29		
5 Purebreds...	Improved Large Yorkshire	July 3.....	52	113	3.24
		June 15.....	48	82	3.90

Table XI. shows the quantity of a mixture of equal parts by measure of barley, rye, frosted wheat (all ground) and wheat bran, soaked in cold water for an average period of 18 hours, plus 3 pounds of skim-milk per head per day, consumed per pound of increase in live weight by swine of different breeding. Some of them were fed for a

period of 8 weeks (December 6 to January 31), and some of them for a period of 12 weeks (December 6 to February 28).

TABLE XI.

No. of Swine.	Breeding.	Date of Birth.	Average of live weight per head.		Feed consumed per lb. of increase.	
			Dec. 6.		Meal +	Milk.
		1893.	Lbs.	Lbs.	Lbs.	Lbs.
5 Crossbreds ...	Improved Large Yorkshire sire, and Berkshire dam	June 9...	86	Jan. 31, 150	2·52	2·56
5 Purebreds....	Improved Large Yorkshire.....	June 15...	82	Feb. 28, 191	2·64	2·31
5 Crossbreds ...	Essex sire and Improved Large York-shire dam.....	May 31...	98	Jan. 31, 169	2·88	2·32
4 Grades.....	Tamworth sire and Berkshire grade dam	July 3...	117	do 202	3·10	1·95
5 Crossbreds ...	Berkshire sire, and Improved Large Yorkshire dam.....	June 6...	108	Feb. 28, 223	3·09	2·17
5 do ...	Essex sire, and Improved Large York-shire dam.....	May 31...	83	do 192	3·23	2·53
2 do ...	Berkshire sire, and Tamworth dam...	May 7...	173	do 225	3·77	2·45

Conclusions. From these four series of tests it appears that :—

(1.) The breeding of the swine which gave the largest increase per pound of feed consumed was different in each of the four tests, viz. :—

- Table VIII. { Crossbreds, Berkshire sire and Poland China dam ;
- “ IX., Crossbreds, Improved Large Yorkshire sire and Essex dam ;
- “ X., Grades, Tamworth sire and Berkshire grade dam ;
- “ XI., Crossbreds, Improved Large Yorkshire sire and Berkshire dam ;

(2.) The breeding of the swine which gave the least increase per pound of feed consumed was :—

- Table VIII., Pure bred, Improved Large Yorkshire ;
- “ IX., do do do
- “ X., Crossbreds, Essex sire and Improved Large Yorkshire dam ;
- “ XI., do Berkshire sire and Tamworth dam ;

(3.) There was no constant or appreciable superiority in the breeds and breeding tested, in respect to the quantity of feed consumed per pound of increase in live weight ;

(4.) The difference in the thriftiness, or power to increase in live weight per pound of feed consumed, was greater between different animals in the same litter than between breeds or breeding as such, in different litters ;

(5.) On the whole for fattening purposes, crossbred swine and grades gave better results than pure bred.

SECOND SERIES.

Test in feeding skim-milk.

An experiment was begun to gain further information on the quantity of skim-milk which may be equivalent to one pound of mixed grain in the fattening of swine.

Six Swine of a litter of crossbreds of Improved Large Yorkshire sire and Poland China dam (farrowed Sept. 25th) were put into three lots as nearly even as possible. There were ten pigs in the litter from which they were selected. They were fed on a mixture composed of equal parts by weight of pease, wheat and rye, all ground and soaked in cold water for an average of 18 hours, plus skim-milk to two of the lots.

Pen No. 9 contained 2 swine. They were fed as much of the mixture as they would eat.

TABLE XII.

	Feb. 21.	Mch. 21	Apr. 18	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	246	337	392	.....
Increase in weight.....		91	55	146
Feed consumed.....		290	211	501
do per lb. of increase in live weight.....		3.18	3.83	3.43

Pen No. 10 contained 2 swine. They were fed at the rate of **three-quarters** as much of the mixture per day as was consumed by the two swine in pen No. 9, plus as much skim-milk as they would drink.

TABLE XIII.

	Feb. 21.	Mar. 21.	Apr. 18.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	240	328	413	.....
Increase in weight.....		88	85	173
Feed consumed.....		217½	158½	375¾
do per lb. of increase in live weight.....		672	1,219	1,921
		2.47	1.86	2.17
		7.63	14.69	11.10

Pen No. 11 contained 2 swine. They were fed at the rate of **half** as much of the mixture per day as was consumed by the 2 swine in pen No. 9, plus as much skim-milk as they would drink.

TABLE XIV.

	Feb 21.	Mar. 21.	Apr. 18.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	231	311	404	.....
Increase in weight.....		80	93	173
Feed consumed.....		145	105½	250½
do per lb. of increase in live weight.....		978	1,685	2,663
		1.81	1.13	1.44
		12.22	18.11	15.39

Conclusions. From these tests with 6 swine, which were continued 8 weeks, it appears that:—

(1.) When 2 swine were fed **three-quarters** as much of a mixture of grain as other 2 swine consumed per day, they consumed in addition, a quantity of skim-milk which made 1 lb. of the mixture of grain equal to **8.82 lbs. of skim-milk**, in the feed consumed per pound of increase in live weight.

(2.) When 2 swine were fed half as much of a mixture of grain as other 2 swine consumed per day, they consumed in addition, a quantity of skimmilk which made 1 lb. of the mixture of grain equal to 7.76 lbs. of skim-milk, in the feed consumed per pound of increase in live weight.

Summary of comparative value of skim-milk and grain, in feed consumed per pound of increase in live weight.

From tests made in 1892, 1893 and 1894 with 48 swine it appears that when a small quantity (about 3 lbs. per head per day) of skim-milk was fed, a less quantity of it was equal to 1 lb. of the grain in the feed consumed per pound of increase in live weight, than when a large quantity (about 15 lbs. per head per day) was fed.

The results are shown in the following table :—

TABLE XV.

No. of swine in test.	Skim-milk consumed per head per day.	
	Lbs.	
31	3	1 pound mixed grain equal to 3.23 lbs. skim-milk
4	5.4	1 do do do 5.38 do
4	13.6	1 do frosted wheat do 7.91 do
5	15.7	1 do mixed grain do 7.34 do
2	17.1	1 do do do 8.82 do
2	23.7	1 do do do 7.76 do

Conclusions. From these tests and from our experience in feeding young pigs, it appears that :—

(1.) Skim-milk may form the largest part of the feed of young and growing pigs with advantage and economy ;

(2.) For the fattening of swine weighing on the average over 100 lbs. each, live weight, it is economical to give an allowance of skim-milk not exceeding 5 lbs. per head per day ;

(3.) In every case the swine fed with part of their ration of skim-milk were lustier, more vigorous and of a more healthy appearance than swine fed wholly on a ration of grain.

THIRD SERIES.

To discover the cause of "soft" hogs.

A series of experiments were begun to discover the effect on the quality of the meat and cured bacon from the feeding of wheat and buckwheat to swine. Complaints were common from buyers of swine in Western Ontario that the quality of flesh was soft in a larger percentage of animals than formerly ; and an opinion was current to the effect that the "softness" was the result of the feeding of wheat or of buckwheat.

Fourteen swine of three different litters were sorted into three lots as nearly even as possible.

Pen No. 2 contained 4 swine of the following breeding :—

2 Crossbreds by *Berkshire* sire and *Improved Large Yorkshire* dam ;

1 do *Tamworth* sire and *Berkshire* dam ;

1 Pure bred *Tamworth*.

These were fed on a mixture of equal parts by measure of barley, rye, wheat (all ground) and wheat bran, soaked in cold water for an average period of 30 hours.

TABLE XVI.

Pen No. 2.	July 25.	Aug. 22.	Sept. 19.	Oct. 10.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	
Live weight.....	477	624	718	786	.....
Increase in weight		147	94	68	309
Feed consumed		614	382	326	1,322
do per lb. of increase in live weight..		4.17	4.06	4.79	4.28

Pen No. 4 contained 5 swine of the following breeding :—
3 crossbreds by *Berkshire* sire and *Improved Large Yorkshire* dam.
2 do *Tamworth* sire and *Berkshire* dam.

These were fed on ground wheat, soaked in cold water for an average period of 30 hours.

TABLE XVII.

Pen No. 4.	July 25.	Aug. 22.	Sept. 19.	Oct. 10.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	483	620	716	793	
Increase in weight		137	96	77	310
Feed consumed		616	369	287	1,272
do per lb. of increase in live weight..		4.49	3.84	3.72	4.10

Pen No. 6 contained 5 swine of the following breeding :—
3 crossbreds by *Berkshire* sire and *Improved Large Yorkshire* dam.
1 do *Tamworth* sire and *Berkshire* dam.
1 purebred *Tamworth*.

These were fed on ground buckwheat, soaked in cold water for an average period of 30 hours.

TABLE XVIII.

Pen No. 6.	July 25.	Aug. 22.	Sept. 19.	Oct. 10.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	515	632	840	989	
Increase in weight		117	208	149	474
Feed consumed		655	794	660	2,109
do per lb. of increase in live weight..		5.59	3.81	4.42	4.45

On October 11th these 14 swine were shipped alive to the Ingersoll Packing Company, Ingersoll, Ont., to be slaughtered and cured in the manner followed by packers who send bacon and hams to the British market. The swine of each lot were marked differently, and a report was made upon them by the manager of the Ingersoll Packing Company, according to the descriptive marks.

The report on the condition of the swine, 10 hours after they were killed, was as follows :—

“Lot 1, fed on mixed grain ; leaf lard, fairly firm ; best of the three lots.

Lot 2, fed on ground wheat ; lard, softish ; not so firm as hogs of lot 1.

Lot 3, fed on ground buckwheat ; lard soft, and hogs also soft.

The report on the sides of bacon after they were cured was as follows :—

Lot 1, fed on mixed grain ; four hogs ; all the sides turned out good hard meat, they were the best of the three lots.

Lot 2, fed on ground wheat ; five hogs ; six sides were soft and four quite firm.

Lot 3, fed on ground buckwheat, five hogs ; two sides were soft and eight sides were firm.”

Conclusions.—From these tests it is evident that the feeding of wheat alone and of buckwheat alone is **not always a cause** of “soft” hogs and “soft” sides, since some of the swine fed on wheat and buckwheat yielded sides classed as firm. Further tests in this connection are in progress.

Quantity of grain per pound of increase in live weight.

From feeding experiments extending over three years in the fattening of 112 swine upon grain, it appears that :—

1. On the average **4.38 lbs. of grain** (barley, rye, pease, wheat, frosted wheat, and wheat bran) was the quantity consumed per pound of increase in the live weight ;

2. In the feeding of grain, considering quantity of feed consumed, and the general health of the animals, it is profitable to feed the **grain ground and soaked** in water for an average period of about 30 hours ;

3. It is profitable to add about 3 or 5 lbs. of **skim-milk or buttermilk** per head per day to the grain fed to fattening swine.

PART II.—THE EXPERIMENTAL DAIRY.

The work at the Experimental Dairy, which has been carried on far enough to be reported upon, comprises the following :—

- (1.) Comparative tests of pure Cultures of bacteria in the ripening of cream ;
- (2.) Churning cream at different stages of ripeness.

I. COMPARATIVE TESTS OF PURE CULTURES OF BACTERIA.

It is well known that the flavours peculiar to butter and cheese are due to the development and growth of bacteria in the milk or cream before and after they are manufactured.

Bacteriologists have rendered valuable service to the dairy industry through patient and intelligent research. Selecting from samples of first class butter or ripe cream, certain species of bacteria, which seemed to impart to the butter that flavour which is found in good butter only, and cultivating them in a sterilized medium, —sometimes using milk, cream and whey—when they found what they considered the right ones, they placed on the market what is known as pure Cultures of bacteria for ripening cream. In the course of the last few years several of these Cultures have been obtainable, and now the question is often asked : “Which is the better or best ?” To help to ascertain that, was the object of these practical tests.

The Cultures put under test were:—

1. Zoffmann's pure Culture of lactic ferment (liquid.)
2. Chr. Hansen's " " " " " (dry.)
3. Central Experimental Farm Culture (liquid.)
4. Ordinary buttermilk (liquid.)

"Fermentation starter" is the designation applied to the portion of fermented (or sour) milk, buttermilk or cream which is added to cream to ripen it for churning. The ripening of the cream consists in the development of the ferment or ferments which are added to it, or which get into it from the atmosphere, from contact with vessels or utensils or from other sources.

The milk which was used in the preparation of the fermentation starters herein reported on, was treated according to the directions, issued by the manufacturers of the Cultures of lactic ferment before they were added to it. The fermentation starters which were used in tests recorded in table 2 were prepared directly from the cultures as received from the manufacturers. There was no likelihood of a deterioration of them before the tests were made. The cream used in the tests was previously pasteurized (heated to 154° Fahr,) and all other conditions of treatment were alike in the tests.

The first named Culture was originated and manufactured by Mr. Zoffmann of Denmark, and was sent here by Mr. Ed. Wagner, of New York, arriving in apparently good condition; the fermentation starter prepared from it always had a flavour similar to that of sour whey; it also had a somewhat more "rennetty" action on the milk and cream into which it was put, than the others at the same temperature. When the starter, prepared from it, was left standing for a short time, the whey or water appeared on the surface.

The Chr. Hansen's Culture was prepared at Chr. Hansen's bacteriological laboratory, Copenhagen, Denmark. At first the Culture was put on the market in liquid form, but as it did not keep satisfactorily when shipped to distant places, a change was made in its preparation, and it can now be obtained in dry form, from the leading dealers in dairy supplies. It is claimed that it will keep quite vigorous for at least 6 months in a dry state when properly sealed. The fermentation starter prepared from it had a pleasant, clean, though somewhat weak flavour.

The Central Experimental Farm Culture was prepared at the dairy here. A small quantity—about two quarts—of skimmed milk was heated to 205° Fahr. The temperature was maintained at that point for ten minutes, after which, and while exposed to the atmosphere of the butter-making room, it was cooled to 80° Fahr. It was left in a closed glass-stoppered bottle at the ordinary temperature of the dairy room, from 60° to 70° Fahr., for five days. It was then found to be coagulated and to possess a mild, pure, lactic-acid flavour, which became more distinct, after it had been kept in cold water at a temperature of 40° Fahr. for three days. This was the Culture. As the flavour was such as was characteristic of cream from which fine-flavoured butter had always been obtained, it was decided to prepare from it, a fermentation starter for the ripening of cream.

The fermentation starter was prepared by heating a quantity of skim-milk, (equal to about ten per cent of the quantity of cream to be ripened) to 150° Fahr. The temperature was maintained at that point for ten minutes, after which it was cooled to 80° Fahr. A portion of the Culture, at the rate of ten per cent of the quantity of skim-milk, was then added to it. This became the 'fermentation starter.' It was left to ripen at a temperature, not exceeding 80° Fahr. for 20 hours. When the flavour and odour were distinctly acid, it was placed in cold water at a temperature of 40° Fahr. and kept cold in order to arrest further development of the ferment. The flavour was somewhat sharp and quite pure. The butter made from the cream which was ripened with it, had a richer flavour and better keeping quality than that made from the others.

The butters were examined and scored, as shown in tables I. and II.

Table III. shows a summary of 41 tests made of the different fermentation starters at different seasons of the year. The figures are representative of the whole year. The pure Culture in 16 cases was that which was prepared by Chr. Hansen, in two cases that prepared by Zoffmann. The cream used in these tests was separated from the milk by a centrifugal machine.

TABLE III.

	Buttermilk Culture.	Pure Cultures.	Central Experimental Farm Culture.
Number of tests made.....	14	18	9
Temperature for cream ripening..... Fahr.	67·5°	75°	74°
Period for cream ripening hours	14	14	14
Temperature of cream when churning was started..... Fahr.	56°	57°	57°
Period of churning..... minutes	29	22	19
Fat left in buttermilk..... per cent	0·15	0·14	0·16
Butter made per 100 lbs. of fat in milk..... Lbs.	117·06	117·58	118·73
Proportional yield.....	100·00	100·44	101·43

Conclusions.—From these tests it appears that :—

- (1.) The flavour of butter is largely determined by the ferments (or bacteria) which develop in the milk or cream ;
- (2.) The ferments (or bacteria) which cause milk and cream to ripen (or turn sour) are ordinarily introduced into them from the atmosphere, from the milk vessels, from the bodies of the cows or and from the clothing and persons of the milkers ;
- (3.) Where no disease exists and where no offensive odour is prevalent, the ferments (or bacteria), which get into the milk and cream, produce only odours and flavours which are agreeable in the butter ;
- (4.) The atmosphere of a thoroughly clean dairy building, contains ferments (or bacteria) which get into all milk and cream exposed to it, and which are capable of imparting to the butter a flavour of high market value ;
- (5.) The Culture of ferments (or bacteria) obtained from that source—the Central Experimental Farm Culture—imparted a more valuable flavour to the butter, than the pure Culture of lactic ferment from the laboratories of Messrs. Zoffmann and Chr. Hansen ;
- (6.) A slightly larger quantity of butter was made per pound of butter-fat in the cream, and a little shorter period of churning, (three minutes less), was required after the use of the Central Experimental Farm Culture, than after the use of the other Cultures tested ;
- (7.) Every butter-maker may make a Culture of ferments (or bacteria) for the making of a fermentation starter of excellent quality, in his or her own butter-making room, if everything in and about it be kept scrupulously clean ;
- (8.) The use of a fermentation starter of fine flavour, imparts to the butter made from stable-fed cows, and from cows which have been milking for periods of more than six months, a flavour of high market value, which is not usually obtainable otherwise.

II. CHURNING CREAM AT DIFFERENT STAGES OF RIPENESS.

A series of tests were made to ascertain the effect of churning the cream at different stages of ripeness, on the quantity, flavour and keeping quality of the butter made therefrom.

Table IV. shows the particulars.

The ripening of the cream recorded in the first and second columns of the table was commenced at a temperature of 80° Fahr. As soon as the cream was at the desired con-

dition of ripeness, (*i. e.* thick and slightly sour), it was cooled to the churning temperature—57° Fahr. One-half of it was churned at once, and the remaining half was left for eight hours more before it was churned. Four additional tests were made with cream ripened in 12 hours, and this being done in one of the warm months of summer a temperature of 76° proved to be sufficiently high, hence the lowering of the temperature for ripening in the second column to the average of 78° (as shown in table.) The sweet cream (third column) was kept in ice water to the time of churning. In each of four of these tests, the cream was all mixed in one lot, before it was divided into lots for different treatments.

TABLE IV.

	20 hours ripening.	12 hours ripening.	Churned sweet.
Number of tests made.....	4	8	5
Quantity of cream.....Lbs.	118	159	142
Fat in cream.....“	28·50	34·10	30·59
Temperature for cream ripening.....Fahr.	80°	78°	.....
Period for cream ripening.....hours.	20	12	.....
Temperature of cream when churning was started.....Fahr.	57°	57°	58°
Period of churning.....minutes.	25	20	28
Fat left in buttermilk.....per cent.	0·09	0·10	0·15
Quantity of butter manufactured.....Lbs.	34·15	40·54	36·03
Butter per 100 lbs. of fat in cream.....“	119·82	118·88	117·78
Proportional yield.....	101·73	100·93	100·00
Score for flavour after 10 weeks.....	*40	40	38
	No commercial difference; the 20 hours lots were of a slightly fuller flavour than the others.		Weak flavour.

*45 points for perfection.

Conclusions.—From these tests it appears that :—

- (1.) A slightly greater yield of butter, (·94 of a pound of butter per 100 pounds of butter-fat in the cream), was obtained from cream which was ripened for 20 hours, than from cream ripened for 12 hours ;
- (2.) The butter from the cream which was ripened for 20 hours, was slightly richer in flavour but was of no higher commercial value, than that from the cream ripened 12 hours.
- (3.) The butter from the cream which was churned sweet was slightly less in quantity, (1·10 pounds and 2·04 pounds of butter respectively per 100 pounds of butter-fat in the cream), than the butter from the lots of cream ripened for 12 hours and 20 hours respectively ;
- (4.) The butter from the cream which was churned sweet was 2 points lower in flavour, than that from the ripened cream.

III. NOTES ON BUTTER-MAKING BY THE USE OF CENTRIFUGAL SEPARATORS.

These have been prepared to meet the needs of butter makers who desire the assistance of specific simple directions.

The Milk.—The milk for the separator should be carefully strained and heated to a temperature of 80 or 85 degrees Fahr. If the milk be fed at a lower temperature, the cream is apt to become thick and clotted in the cylinder of the separator.

Cold milk has a greater density than that of milk at a higher temperature ; and therefore the higher temperature up to 85 degrees, the greater the efficiency of the separation, all other conditions being equal.

Particular care should be exercised to prevent the mixing of any bitter milk with the general supply. If any appreciable quantity of bitter milk be mixed, the result will be a quality of butter likely to be more or less bitter in flavour. In very bad cases it may become quite oily. These are both serious defects in butter.

In creameries where the heating and cooling conveniences are rather limited, to separate the milk at a temperature of 80° Fahr. will be satisfactory ; but in those cases the inflow of milk should be lessened and be regulated according to the percentage of fat which is discovered to be left in the skim milk. That should be reduced to one-tenth of one per cent.

The Separator.—While there are differences in the capacity and construction of different separators, the efficiency of the skimming depends largely upon the skill and management of the operator. The thoroughness of the separation of the fat depends, mainly on : (1) The speed at which the separator is run ; (2) the temperature of the milk ; and (3) the quantity of milk run through per hour. It is desirable that the separator be run at its maximum of speed, and that that be not exceeded. The different manufacturers of separators guarantee their machines good for a certain maximum speed, which is usually stamped on the bowl.

When the quantity of cream to be separated can be regulated by a set screw in the bowl, that should be set to allow from 14 to 16 per cent of the quantity of milk to flow through the cream outlet. A good rule is to take off cream which contains about 25 per cent of butter fat.

Ripening of the Cream.—The temperature of the cream when set to be ripened, may vary from 65° to 80° Fahr. according to the season. The higher temperature is used during the late fall and winter.

The temperature at which it is set for ripening, should be maintained for about 6 hours, during which time it should be stirred occasionally. After that, it should be left undisturbed until ripe for churning. No close cover over the cream vat need be used. A clean canvas cover is sufficient. Care should be taken to purify the canvas cover by boiling it frequently.

Fermentation Starter.—It is quite important that every butter-maker should have on hand a fermentation starter of a pure clean flavour and of a uniform smooth consistency. The fermentation starter may be prepared from skim-milk which is pure, sweet and free from taint. The milk should be heated to 150 degrees Fahr. and left at that temperature for 10 minutes. It may then be cooled to a temperature of 80 degrees Fahr., when the bacteria Culture should be added. Bacteria Cultures may now be obtained in the market from firms who deal in dairy supplies. A Culture may be prepared in the manner described on page 87 of this report, or some buttermilk of pure nice flavour may be used instead. In the latter case the buttermilk should be added, at the rate of 10 per cent, to the skim-milk, which has been heated to 150° Fahr. The can or vat in which the fermentation starter is set must be perfectly clean and free from rust spots or other sources or causes of contamination. Where the butter-maker has not a specially constructed fermentation-starter vat, he may use a clean tin can and cover it with four ply of cheese cloth or butter cloth which has been kept in boiling water for at least 10 minutes. The vessel containing the starter should then be put in a place where the temperature will be maintained at from 75° to 80° Fahr. until the whole is curdled. It may then be cooled down gradually. When the acid becomes quite distinct it is ready for use. Where no bad flavour exists and no difficulty has been experienced in churning, it is quite safe to use the buttermilk of the previous churning as a fermentation starter for the cream. If at any time the flavour of the butter seems to deteriorate, a new vigorous starter should be secured and that again should be renewed whenever found to be necessary.

The fermentation starter may be added to the cream at the rate of from 5 to 10 per cent of the quantity of cream.

In any case where the cream has become somewhat tainted from any cause, a comparatively larger quantity than usual of a fermentation starter should be added. This may in a great measure check the development of the taint (if it be of fermentation origin) and leave the particular fermentation of the added starter to be the prevailing one.

Churning.—The preferable degree of ripeness in the cream will be indicated by the following points,—a mild, pleasant acid taste, a uniformly thick consistency, and a glossy appearance, somewhat like white oil paint. If not at the exact temperature desired for churning, it should be cooled or warmed to that point, which may range from 54 to 58 degrees Fahr., according to the season. It should be *strained* into the churn and the churn should not be filled to more than two-fifths of its capacity.

If butter colour is to be used, it should be added to the cream before the churning is commenced. The regular speed of a factory revolving churn should be about 65 revolutions per minute; and when butter granules are formed in the churn, a few gallons of weak brine (salt and water), should be added, to assist in the separation between the granules of butter and the buttermilk, and also to give a firmer body to the butter.

The churning should then be continued until the granules of butter become a little larger than clover seed. The buttermilk should then be drawn off and a quantity equal to the buttermilk, of pure cold water, at a temperature of from 50 to 58 degrees Fahr., according to the season, should be put into the churn, for the purpose of washing out the buttermilk from the butter granules. The churn should receive a few quick revolutions, and the water should be drawn off immediately. Attention to this is of some importance, as the water will contain more or less curdy matter, which, if allowed to settle on the sides of the churn, forms a film there, where it is apt to adhere to the butter when that settles gradually as the water is drawn off.

After the butter has been left to stand for some 20 minutes, it should be salted at the rate of from one quarter of an ounce of salt per pound of butter to one ounce of salt per pound of butter, according to the preferences of the market which is to be supplied. The very finest quality of pure butter salt only should be used. That which is of a uniform fineness of grain and velvety to the touch is suitable.

The Working of the Butter.—After the butter is salted it should be left for 2 or 3 hours, to allow the salt to dissolve. Then, by a second working, the excess of moisture may be expelled, the salt thoroughly mixed, and any streakiness in colour corrected. Care must be taken that the butter be not overworked and made greasy. This may result from the butter being worked at a temperature either too high or too low. Where practicable, it should be worked at a temperature which leaves it in a waxy condition, causing it to bend about one-half towards the under layer when it is being doubled on the butter worker. Sometimes injury results from a larger quantity being placed on the butter worker than can be handled conveniently.

Preparing Packages and Packing the Butter.—Where the butter packages are not tinned or paraffine lined, they should be filled with strong hot brine and left to soak for a day. The brine may be used several times, if boiled each time. The insides of the packages should then be rubbed with fine salt and a lining of butter cloth or parchment paper, preferably the latter, should be put in. The package will then be ready for filling.

In packing, the butter should be pressed against the side of the package, keeping it slightly hollow in the centre of the package, the object being to pack the butter so close to the side that no air spaces will be left between the butter and the package. These are often seen when a tub or box of butter is “stripped.” Care must also be exercised in using the packer, not to move the butter more than is really necessary to make it compact. When the package is filled, the surface should be smoothed with a hardwood ladle or scraper, and then covered with fine butter cloth or strong parchment paper.

PART III.—THE FORTY-ACRE LOT.

In 1891 about forty acres of land were set apart for the purpose of growing fodder crops for cattle in order to illustrate how many cattle might be fed each year upon the products of that area. It was not intended that any method of cultivation should be adopted which would require the employment of hand labour to an extent beyond the reach of the ordinary farmer. The main object was to direct the attention of farmers to the practicability of keeping cattle in larger numbers than had been their custom on the moderate and small-sized farms of Canada. The soil in the part of the farm devoted to this experiment is of a clay and sand loam—varying from a very light sand to a compact clay.

A dressing of barnyard manure was applied to 29 acres of the lot in the spring of 1891, at the rate of from 18 to 20 tons per acre. Since that time no manure or fertilizer has been applied except that obtained from the cattle fed on the crops grown on the lot. Small quantities of additional grain have been fed to these cattle, as the crops have been found insufficient to carry the number of cattle put on the 40-acre lot at the beginning of the different years.

The crops suffered from the misfortune of unfavourable weather in 1891 and 1893.

By the steps which were taken in 1892-93 to stamp out the disease of tuberculosis from the herd, it became impracticable to continue the feeding of a number of the cows on the crops from this lot. The feeding of cows to the number of 30 altogether, on the crops from the 40-acre lot, was resumed July 7th, 1894.

The following records of the crops show the progress of the experiment:—

TOTAL YIELD OF CROPS FROM 40-ACRE LOT IN 1891.

Ripened Crops.

		Lbs of Straw.	Lbs. of Grain.
8 acres,	Mixed Cereal Crop.....	26,454	13,245
3 acres	{ Golden Vine Pease.....		905
	{ Goose Wheat.....	1,003	437
	{ Beardless Barley.....	3,102	1,373
	{ Banner Oats.....	2,790	2,060
3 acres,	Mixed Cereal crop.....	10,442	4,345
14	Totals.....	43,791	22,365

Root Crops.

		Lbs.
1 acre,	Carrots.....	26,785
1 acre,	Mangels and Turnips { Mangels.....	8,110
	{ Turnips.....	9,655
1 acre,	Turnips.....	29,584
3	Total.....	74,134
$\frac{1}{2}$ acre,	Cabbage and Kohl Rabi.....	15,296

Cured Fodder Crops.

	Lbs.
2 acres, Spring Rye.....	14,080
Mixed Cereal crop (second cutting).....	1,825
1 acre, Indian Corn, stooked and cured.....	11,940
11½ acres, Indian Corn, put into silos.....130 Tons.	1,750
<u>14½</u>	
1½ acres, Indian Corn, fed green to cattle from 7th of August.	
3½ acres, Mixed Cereal crop, fed green to cattle.	
4½ acres, pastured.	

The total cost for labour in the growing of these crops of 1891, and in the delivering of them at the barn, silos or stable, threshed or cut and ready to feed, was as follows:—

Hauling and spreading of manure.....	\$109 62
Ploughing, harrowing, sowing and planting.....	114 00
Hand cultivating and weeding.....	85 62
Cultivating by horse.....	23 65
Reaping, teaming, threshing, cutting, grinding, etc.....	223 70
Other labour.....	9 15
	<u>\$565 74</u>
Permanent improvements, draining and fencing.....	33 50

The time of a man and team of horses was charged at the rate of \$2.50 per day and the time of a man at \$1.25 per day.

TOTAL YIELD OF CROPS FROM 40-ACRE LOT IN 1892.

Cereal Crops.

	Lbs. of Straw.	Lbs. of Grain.
8.75 acres, Mixed Cereal crop.....	25,039	13,317
	Lbs., cured Fodder.	
5 acres, Mixed Cereal crop.....		32,605
	Lbs., green fodder.	
1.75 acres, Mixed Cereal crop, (fed green).....		22,801
3.25 acres, Fall Rye.....		26,155
1.9 acres, Spring Rye.....		15,910
Second cutting of Spring Rye (partly cured)		4,040

Root Crops.

	Tons.	Lbs.
2 acres, Carrots.....	25	1,015
2 acres, Mangels	28	1,128
1 acre, Greystone Turnips (catch crop after mixed cereals)...	10	305

Indian Corn Crops.

	Tons.	Lbs.
9 acres, Indian Corn	156	352
3 acres, Indian Corn.....	39	1,065
3 acres, Indian Corn.....	38	860
·46 acre, Indian Corn and Sunflowers.....	4	1,720
·46 acre. Sunflower heads.....	3	710
·41 + acre, Horse Beans.....	2	1,760
2.43 acres, pastured.....		

The total cost for the growing of the crops in 1892 from 45.41 acres (of which 4 acres were cropped twice) was \$795. That included rent of land at \$3 per acre, the labour for cultivation, seed, sowing, harvesting and delivering them, at the barn, root-house, silos or stable, threshed or cut and ready to feed. It also included an allowance for proportion of time of farm foreman : but it did not include any allowance for the use of farm machinery (except the engine), nor did it include any amount as an equivalent for the exhaustion of soil or the application of manure.

The time of a man was reckoned at \$1.25 per day and the time of a man and team of horses at \$2.50 per day.

TOTAL YIELD OF CROPS FROM 40-ACRE LOT IN 1893.

Cereal Crops.

	Lbs. of straw.	Lbs. of grain.
3.31 acres, Mixed Cereal crop.....	7,802	1,948
5.60 acres do	23,061	8,025
		Lbs. cured fodder.
.78 acres do		2,500
.29 acres Fall Rye fed green.....		.....
3.71 acres do		20,685
1.88 acres Clover, first crop.....		8,310
do second crop not all cured.....		6,660

Root Crops.

	Tons.	Lbs.
2 acres, Carrots.....	48	310
2 acres, Mangels.....	40	140

Indian Corn and Horse Bean Crops.

	Tons.	Lbs.
14 acres Corn and Horse Beans, mixed.....	163	574
4 acres do (after Rye).....	39	1,335
4 acres Sunflower heads.....	13	555

Pasture.

2.43 acres.
1.88 acres after clover was cut.

The total cost for the growing of the crops in 1893 from 44 acres (of which 4 acres were cropped twice), was \$833. That included rent of land at \$3 per acre, the labour for cultivation, seed, sowing, harvesting and delivering them at the barn, root house, silos or stable, threshed or cut and ready to feed. It also included an allowance for proportion of time of farm foreman ; but it did not include any allowance for the use of farm machinery (except the engine) ; nor did it include any amount as an equivalent for the exhaustion of soil or the application of manure. The time of a man was reckoned at \$1.25 per day, and the time of a man and team of horses at \$2.50 per day.

TOTAL YIELD OF CROPS FROM 40-ACRE LOT IN 1894.

Cereal Crops.

	Lbs. cured fodder.
7.75 acres, Mixed Cereal crop.....	36,200
1 acre do cut green.....	15,390

Root Crops.

	Tons.	Lbs.
2 acres, Carrots.....	56	1,509
2 acres, Mangels.....	42	1,398

Indian Corn and Horse Bean Crops.

	Tons.	Lbs.
4 acres, Corn and Horse Beans, mixed.....	55	1,165
5.35 acres, Corn... ..	66	1,505
7.75 acres do	94	1,473
2.75 acres do and Horse Beans (grown after crop of Mixed Cereals was cut).....	6	732
4.18 acres, Horse Beans, weighed green.....	51	1,940
4 acres Sunflower heads.....	14	35

Pasture.

4.31 acres.

The total cost for the growing of the crops in 1894 from 45.09 acres (of which 2.75 acres were cropped twice) was \$816.54. The details are given hereafter.

NOTES ON THE MIXED CEREAL CROPS.

7.75 acres of Mixed Cereal crops.—A different mixture, of *Rio Grande Wheat*, *Canadian Thorpe Barley*, *Banner Oats* and *Mummy Pease*, was sown on each of seven plots. One bushel of *Granton Horse Beans* was sown on each acre in addition, and also 3 lbs. of *Flax*. By reason of damage from weather and the uneven character of the soil, the yields per acre from the different mixtures, do not give results which can be taken as evidence of the best mixtures of these grains for fodder crops.

TABLE I.

Number of Plot.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Mixture sown—							
Wheat..... Bush.	1 3/4	1	1	.....	1	1 1/2	.....
Barley..... do	1 3/4	1	.....	1	1	.....	.....
Oats..... do	1	.....	1	1	1	.....	1 1/2
Pease..... do	3/4	1	1	1	.....	1 1/2	1 1/2
Horse Beans..... do	1	1	1	1	1	1	1
Yield of cured fodder per acre. Lbs.	4,839	5,179	5,019	4,419	3,460	3,979	5,065

Plots No. 4, 5 and 6 were injured to the extent of nearly a quarter of an acre in each, by water standing on them.

1 acre of Mixed Cereals.—This was sown with a mixture of *Canadian Thorpe Barley* 1 1/2 bushels; *Mummy Pease*, 1 1/2 bushels; *Granton Horse Beans*, 1 bushel; and *Flax* 3 lbs. From July 4th it was cut and fed to the cattle. The green weight per acre was 15,390 pounds.

COST OF LABOUR FOR GROWING CROP OF MIXED CEREALS.

The following is a statement of the cost of labour for growing 7.75 acres of mixed cereals and putting the crop in the barn :—

Rent of land, at \$3 per acre.....	\$ 23 25
Ploughing, at \$2 per acre.....	15 50
Harrowing twice, rolling once, at 20 cents per acre each.....	4 65
Disc harrowing, 6 acres, at 50 cents per acre.....	3 00
Seed.....	28 60
Sowing 1/10 day, at \$2.50 per day.....	2 25
Cutting and drawing to barn, 4 2/10 days at \$2.50 per day.....	10 50
Horse-rake and horse-fork, 3 1/10 days, at \$1.75 per day.....	5 42
Labour, cocking, turning, loading and unloading, 24 1/10 days, at \$1.25	30 62
Proportion of time of farm foreman.....	15 50
	\$139 29

These figures do not include any allowance for the use of farm machinery, nor do they include any amount as an equivalent for the exhaustion of the soil.

The following table shows, for three years—(1) the cost per acre for labour ; (2) the yield per acre of cured fodder, and (3) the cost per ton for labour of growing, including rent of land, cost of seed, etc., as in statement :—

TABLE II.

—	Cost per acre.	Yield per acre.		Cost per ton.
	\$	Tons.	Lbs.	\$
1892.....	12.90	*3	521	39.5
1893.....	12.30	.....	.....	.....
1894.....	17.97	2	671	7.69
Average.....	14.39	2	1,596	58.2

* Crop of 1893 ripened and threshed.

ROOT CROPS.

4 Acres of Root Crops.—The soil was ploughed in autumn of 1893, and was gang-ploughed 6 inches deep in spring of 1894. It was harrowed with smoothing harrows three times. Drills were made up with a drill plough two feet apart. Manure or fertilizer was not used on this plot. The crop in 1893 was mixed cereals.

The Carrots were sown May 1st, and came up May 12th and 13th. They were pulled October 25th and 30th.

1 acre, Improved Short White, yielded.....29 tons 1,403 lbs.
1 acre, Mammoth White Intermediate, yielded:.....27 tons 106 lbs.

The Mangels were sown May 1st and 3rd, and came up May 12th and 13th. They were pulled October 16th and 17th.

1 acre, The Gate Post or Mammoth Long Red, yielded....21 tons 150 lbs.
1 acre, Mammoth Long Red, yielded.....21 tons 1,248 lbs.

The following tables show, for three years—(1) the cost per acre for labour ; (2) the yield per acre ; and (3) the cost per ton for labour of growing, including cost of seed, delivery at the root house, \$3 per acre rent of land and proportion of time of farm foreman. The figures do not include any allowance for the use of farm machinery, nor do they include any amount as an equivalent for the exhaustion of the soil. The cost of growing Carrots and Mangels was not kept separate in 1892 :—

Carrots.

TABLE III.

—	Cost per acre.	Yield per acre.		Cost per ton.
	\$	Tons.	Lbs.	\$
1892.....	33.86	12	1,507	2.65
1893.....	42.22	24	155	1.75
1894.....	46.85	28	754	1.65
Average.....	40.97	21	1,472	2.01

Mangels.

TABLE IV.

—	Cost per acre.	Yield per acre.		Cost per ton.
	\$	Tons.	Lbs.	\$
1892.....	33.86	14	564	2.37
1893.....	31.57	20	70	1.57
1894.....	32.42	21	699	1.51
Average.....	32.61	18	1,111	1.81

INDIAN CORN CROPS.

2 acres of Longfellow Corn (18 lbs. per acre mixed with 30 lbs. of Granton Horse Beans per acre.)—Land received a dressing of barnyard manure at the rate of ten tons per acre ; planted May 21st ; Corn came up June 4th and 6th ; Beans came up June 6th and 8th. On September 25th a frost (of some 10 degrees), blighted the leaves and caused the crop to dry out probably 25 per cent from the green weight, before it was cut and put into the silo. The Horse Beans among the Corn did not grow well and amounted to only 2½ per cent of the total weight of crop. The total yield from the two acres weighed 27 tons 1,655 lbs.

2 acres of Longfellow Corn (18 lbs. per acre, mixed with 30 lbs. of Tick Horse Beans per acre.)—The Horse Beans in this lot did not grow any better than in the plot where Granton Horse Beans were planted. The effect of the frost on September 25th was alike on all the corn crop on the 40-acre lot. The total yield from the two acres weighed 27 tons 1,510 lbs.

2 acres of Compton's Early Corn (20 lbs. per acre.)—The total yield from the two acres weighed 30 tons 1,300 lbs.

3.35 acres of Longfellow Corn (20 lbs. per acre.)—About one acre was injured by water lying on it in spring ; that part did not yield more than ½ a crop. The total yield from the 3.35 acres weighed 36 tons 205 lbs.

7.75 acres of Longfellow Corn (20 lbs. per acre.)—Some low parts of this field had water standing on them a week after the Corn came up. It was planted May 17th and came up May 29th and 30th. The frost on September 25th blighted the leaves and the Corn was not cut until October 6th and 8th. The total yield from the 7.75 acres weighed 94 tons 1,473 lbs.

COST OF LABOUR FOR GROWING INDIAN CORN FOR FODDER.

The following is a statement of the cost of labour for growing 17.1 acres of Indian Corn and putting the crop into the silos :—

Rent of land at \$3 per acre.....	\$ 51 30
Ploughing at \$2 per acre.....	34 20
Harrowing, three times, 20 cents per acre per time.....	10 26
Rolling and disc-harrowing, ½ day at \$2.50.....	1 25
Seed, including 2 bushels horse beans.....	11 50
Sowing, 2 days at \$2.50.....	5 00
Hoeing, 24½ days at \$1.25.....	30 63
Cultivating with single horse, 8½ days at \$1.75.....	15 05
Cultivating with team, 6 days at \$2.50.....	15 00
Cutting, loading, etc., in field and at silo, 79 days at \$1.25.....	98 75
Drawing in, 16 days at \$2.50.....	40 00
Man at engine, 8 days at \$1.50.....	12 00
Use of engine and fuel, 7 days at \$5.00.....	35 00
Proportion of time of farm foreman.....	34 00
	<hr/>
	\$393 94

These figures do not include any allowance for the use of farm machinery (except the engine), nor do they include any amount as an equivalent for the exhaustion of soil.

The following table shows, for three years—(1) the cost per acre for labour; (2) the yield per acre; and (3) the cost per ton for labour of growing, including cost of seed and rent of land, etc., as in statement :—

TABLE V.

	Cost per acre.	Yield per acre.	Cost per ton.
	\$	Tons. Lbs.	\$
1892	22.68	15 1,218	1.45
1893	22.35	11 550	1.98
1894	23.03	12 1,388	1.81
Average.....	22 68	13 385	1.74

HORSE BEANS.

4.18 acres of Horse Beans.—The land was clay loam. It was ploughed in autumn of 1893, and a dressing of farmyard manure at the rate of 6 tons per acre was ploughed under in the spring of 1894. The Beans were sown June 6th by the use of a force-feed seed-drill having only two spouts delivering seed. These were three feet apart. From 45 pounds to 50 pounds of seed per acre were used. Part of the seed did not germinate, and when the Beans came up numerous spaces, of from 12 inches to 30 inches in the rows, were vacant. These were afterwards planted by the use of hand corn planters. The field was a very weedy one; and an unusual measure of hand hoeing was given to clean it. These two items of unusual expense caused the cost per acre and per ton to be higher than under normal conditions.

1 acre of Horse Beans, of the *Tick* variety, yielded 12 tons 170 lbs.

1 acre of Horse Beans, of the *Granton* variety yielded 12 tons 1,030 lbs.

The Beans were planted June 6th and came up June 13th. They were cut from October 2nd to 6th. Pods were formed on most of the plants, but they were not ripe nor filled. The height of the stalks was from 4½ to 5½ feet.

COST OF LABOUR FOR GROWING HORSE BEANS FOR FODDER.

The following is a statement of the cost of labour for growing 4.18 acres of Horse Beans and putting the crop into the silos :—

Rent of land at \$3 per acre.....	\$12 54
Ploughing in autumn at \$2 per acre.....	8 36
Ploughing in spring at \$2 per acre.....	8 36
Harrowing, three times at 20 cents per acre per time.....	2 51
Seed, 4 bushels at \$1.50.....	6 00
Sowing, ⅕ day at \$2.50.....	1 25
Second planting, 2 days at \$1.25.....	2 50
Cultivating, single horse, 3⅘ days at \$1.75.....	6 65
Hoeing, 16 days at \$1.25.....	20 00
Cutting, loading, etc., in field and at silo, 17 days at \$1.25.....	21 25
Drawing in, 6 days at \$2.50.....	15 00
Man at engine, 2 days at \$1.50.....	3 00
Use of engine and fuel, 2 days at \$5.....	10 00
Proportion of time of farm foreman.....	8 00
	<hr/> \$125 42

These figures do not include any allowance for the use of farm machinery (except engine) nor do they include any amount as an equivalent for the exhaustion of the soil.

The following table shows, for two years—(1) the cost per acre for labour ; (2) the yield per acre ; and (3) the cost per ton for labour, including cost of seed and rent of land, etc., as in statement:—

TABLE VI.

	Cost per acre.	Yield per acre.		Cost per ton.
	\$	Tons.	Lbs.	\$
1893.....	24 80	*8	927	2.93
1894.....	30.00	12	866	2.41
Average.....	27.40	10	896	2.67

*Weighed after being left to wilt in field for two days.

SUNFLOWER HEADS.

4 acres of Sunflowers.—The Mammoth Russian variety was sown April 23rd, by using a Planet Junior seed drill, with 5 lbs. of seed per acre, in rows 3 feet apart. The plants came up thick and were thinned when two or three inches high, so as to leave one plant every 12 or 18 inches in the rows. The heads were allowed to become almost ripe before they were cut ; and they were in a drier condition than in former years. In 1892 the yield per acre was 7½ tons, containing 75·62 per cent of water. In 1894 the heads when cut contained on the average 69·3 per cent of water.

COST OF LABOUR FOR GROWING SUNFLOWER HEADS FOR FODDER.

The following is a statement of the cost of labour for growing 4 acres of Sunflowers and putting the heads into the silos :—

Rent of land at \$3 per acre.....	\$12 00
Ploughing at \$2 per acre.....	8 00
Harrowing, twice at 20 cents each time per acre.....	1 60
Rolling, at 20 cents per acre.....	80
Seed, 20 lbs.....	2 00
Sowing, 1 ⁹ / ₁₀ days at \$1.25.....	2 00
Hoeing and thinning 10 ¹ / ₁₀ days, at \$1.25.....	13 13
Hand-wheel hoeing, 2 days, \$1.25.....	2 50
Cultivating, 2 ⁹ / ₁₀ days, at \$1.75.....	5 07
Cutting and putting into silos, 17½ days, at \$1.25.....	21 88
Horse and cart, drawing in, 6½ days, at \$1.75.....	11 38
Proportion of time of farm foreman.....	8 00
	<hr/> \$88 36

These figures do not include any allowance for the use of farm machinery, nor do they include any amount as an equivalent for the exhaustion of soil. The cost for labour was \$22.09 per acre. The average yield of heads, nearly all ripe, was 3 tons, 1,009 lbs., which gives an average cost of \$6.30 per ton for labour of growing, including cost of seed and rent of land, etc., as in statements.

MILK FROM THE 40-ACRE LOT.

From July 8th, 1894, 30 milking cows have been fed on the crops from the 40-acre lot. A small quantity of wheat-bran and oil-cake is being fed in addition to the crops from the 40 acres.

Some changes have been made in the individual cows composing the herd from time to time. In all 37 cows have been used.

Considering the dates on which most of the cows have 'come in' or will 'come in,' a larger quantity of milk may be expected in the half year from January 1st to July 6th, than in the half year (herein reported on) from July 7th to December 31st.

The total quantity of milk obtained was 59,896 pounds.

It contained, on the average, 3.85 per cent of fat.

The quantity of butter-fat was 2,306 pounds.

A small portion of the milk was fed to young calves ; a quantity was sold for table use ; and the remainder was made into butter.

The yield of butter at the Experimental Dairy has been 115 pounds of butter per 100 pounds of butter-fat in the milk. If all the milk from the 40-acre lot herd had been manufactured into butter, it would have yielded 2,651.9 pounds, from July 7th to December 31st.

REPORT OF THE HORTICULTURIST

(JOHN CRAIG.)

WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit a report of some of the work carried on in the Horticultural Division of the Central Experimental Farm for the year 1894.

The fruit year as a whole may be looked upon as successful and satisfactory, although the meteorological conditions governing spring and early summer were, in some of the best fruit growing regions, notably the Niagara Peninsula, quite abnormal. In that district the apple crop more than any other suffered from the heavy rains of May and June, while the severe drought of midsummer had the effect of decreasing the size of early peaches, pears and apples, as well as ripening them prematurely.

The early and simultaneous ripening of such large quantities had a deleterious effect upon domestic markets, resulting in exceedingly low prices being realized for early peaches and pears. The lack of rainfall emphasized the value of thorough and frequent shallow cultivation, as a means of conserving the moisture of the soil.

In the province of Quebec the necessity of a better system of fertilizing and cultivating the orchard than has been practised in the past is becoming recognized. Apples of greater export value than the varieties now composing the older orchards are being selected where new planting is being done. Nova Scotia has marked an era in her horticultural progress by the establishment of a School of Horticulture, under the control of the Provincial Fruit Growers' Association, and the directorship of Prof. E. E. Faville. This is the only school of its kind in Canada, if not in America.

COLD STORAGE OF FRUITS.

The great success scored by Canada in her exhibit of fruits at the opening of the World's Columbian Exposition, in May, 1893, was, in a large measure, due to the cold storage facilities afforded by the World's Fair authorities, and but for the unfortunate burning of the storage building and with it a great deal of Canadian fruit, the display would have been much more extensive and varied. The fact, however, that summer and autumn apples, like Duchess of Oldenburg, St. Lawrence and Wealthy, were placed in good condition upon the tables during the months of May and June, gave food for thought to the thinking mind, and raised the question of the usefulness of the system to the commercial grower and the shipper of fruit.

It is well known that cold storage and refrigerator cars have played an important part for some years in the economy of marketing the great Californian fruit product. It is also well known that large dealers in great fruit markets, like Chicago and New York, have used in common with produce and commission men cold storage warehouses, in which to hold perishable fruit during periods of low prices owing to over-stocked markets. Our information on these lines has, however, been rather vague and unsatisfactory.

With the object of ascertaining some facts based upon personal experience, preliminary experiments were instituted on this line during the present season.

Arrangements were made with the Montreal Cold Storage Company for storing packages of the different fruits as they matured. In this connection I beg to acknow-

ledge the courtesy and generous assistance rendered by the managers of this company, Messrs. T. J. Chisholm and D. J. McGillis, in aiding me in carrying out the experiments. Although sufficient time has not elapsed since the initiation of the experiments to permit the collection of information of value regarding the later fruits, yet its degree of usefulness in marketing the earlier and more perishable fruits, has been, if not actually defined, quite clearly indicated. The unusual amount of heat and drought in the districts from which the fruit was procured, undoubtedly injured the keeping qualities of the fruit under trial. Last year Wealthy apples grown at Ottawa kept in a cold cellar until May. This year many have already decayed and the remainder are very soft, under the same conditions

PEACHES.

Mountain Rose and Early Crawford peaches, wrapped in tissue paper, packed in 20-pound baskets and stored in an atmosphere of 34 degrees Fahr. on September 5th, remained in good condition till October 1st; soon after this they began to show signs of discolouration. The same varieties under the same conditions, without wrappers, on October 1st showed 5 to 6 per cent decayed. On October 10th 30 per cent of Mountain Rose, wrapped, had decayed; of Mountain Rose, unwrapped, fully 75 per cent were rotten. At this date Early Crawfords were in a relatively better condition, as follows:—Wrapped, 10 per cent decayed; unwrapped, 15 per cent. The decayed fruit did not fall away as is usually the case, but instead lost flavour and colour, while retaining its form. The discoloration began first near the stone and worked outwards. Up to October 1st the flavour was unimpaired, but after this it deteriorated rapidly. I may say the fruit was well ripened before storing took place. Such fruit will not keep more than a few days when taken out of cold storage.

PLUMS.

Lombard and Monroe plums were stored in baskets, the fruit being wrapped and unwrapped as in the case of the peaches. They were stored on September 6th in a temperature of 34 degrees Fahr., which was maintained uniformly throughout.

The results gained on the whole do not differ materially from those with peaches, and indicate that stone fruits as a class cannot be profitably stored for a longer period than three weeks and that in the case of fruit originally well ripened, probably not so long, after this period there is a rapid deterioration both in flavour and firmness.

PEARS.

Bartlett.—Fully ripe, wrapped, packed in baskets, stored on September 1st, began to decay November 15th. The same unwrapped were badly decayed on that date.

Bartlett.—Fully ripe, wrapped and packed in cases holding from 50 to 75 pears each, were in good condition on December 1st. Flavour unimpaired. On December 10th 25 to 30 per cent were rotten; on December 15th fully 50 per cent had decayed. Flavour somewhat impaired.

Flemish Beauty.—Fully matured, wrapped and packed in baskets, decayed earlier than Bartlett, beginning to show signs of rotting on October 15th. The same variety unwrapped began to decay on October 6th.

Flemish Beauty.—Fully matured, wrapped and packed in kegs were in good condition up to November 1st; they decayed rapidly after this and few remained by December 10th.

The unwrapped in kegs had entirely "wasted" by December 6th.

Beurre Clairgeau.—Wrapped in baskets, were in good condition when last examined, December 31st. The same unwrapped were also in good condition on the same day.

Beurre d'Anjou.—Wrapped and packed in kegs and boxes, were also in good condition on December 10th; and the same may be said of Duchess.

It would seem that matured Bartlett and Flemish Beauty cannot be safely kept in storage after November 15th or at latest December 1st.

APPLES.

Trial packages of three varieties of these were sent to the storage warehouse from the Central Farm, as they ripened.

Tetofsky.—Wrapped, packed in baskets, were in good condition with flavour unimpaired up to November 15th, when they commenced to discolour and lose flavour. On December 10th the greater proportion were decayed and unfit for use. There was a little difference in favour of the wrapped fruit, but the improvement was not so marked as in the case of the pears.

Duchess.—Packed the same way, began to decay on December 10th ; the same variety unwrapped showed 8 to 10 per cent of rotten fruit at this date.

Wealthy and *Colvert*.—Both in boxes and barrels, unwrapped, are of course perfect at this date, Dec. 31st. Summer apples, in common with other soft fruits, kept best when wrapped in tissue paper and put up in wooden packages.

GRAPES.

Sample baskets of Lindley, Delaware and Niagara grapes stored on September 27th are at this date, December 20th, in good condition.

The deductions which may be drawn from the results of this preliminary trial in the preservation of fruits by cold storage may be summarized as follows :—

1. Fruit for storage should be picked when fully grown, but before it has thoroughly matured.
2. Early pears, peaches and the larger varieties of plums should be wrapped separately in tissue paper.
3. Tight wooden boxes are the most satisfactory packages for storing and handling. When baskets are used they should be provided with strong "veneer" covers.
4. Stone fruits, such as peaches and plums, under ordinary circumstances should not be held for a longer period than two or three weeks.
5. The marketing season for early pears and apples may be extended from thirty to sixty days, and under favourable circumstances for a longer period.
6. The outcome of experiments with fall and early winter varieties of apples and pears, including samples of grapes, yet remains to be developed.

TOBACCO EXPERIMENTS.

Some of the principal features of the experiments with tobacco, as outlined in my report for 1893, were continued this year. A fewer number of varieties were grown, but in greater quantity.

The season was not as favourable for the growth of this plant as was last year, but the results on the whole were very encouraging. As soon as information from a manufacturer's standpoint, with regard to the quality of the different varieties raised last year, is secured, it will be given to the public, together with the results of experimental work in 1894.

TREATMENT OF FUNGOUS DISEASES.

This branch of my work has entailed a large amount of correspondence during the year, and is one of increasing public interest and importance. Fruit growers and proprietors of small orchards and gardens are awakening to the fact that without taking active measures for the prevention of fungous enemies, the profits from this industry are each year greatly reduced. It is hoped that the important and convincing results of the spraying experiments carried on in conjunction with the Fruit Growers' Association of Ontario, detailed in the body of the report, will be of direct beneficial effect to

orchardists of the Dominion, and that the recommendations will be carried into practice with the opening of spring operations on the farm.

From correspondents I am pleased to find frequent corroboration of the benefits to be derived from spraying. As an instance, Mr. W. W. Dunlop, of Outremont, Que., a large grower of English gooseberries, successfully prevented mildew on "Whitesmith" gooseberries this year, by making two applications of Bordeaux mixture. He now prefers this material to Potassium Sulphide, which was the first preventive remedy recommended, and which also gave good results. Market gardeners are also learning that the "rust" (*Anthracnose*) of beans, and the "rust" of celery may be prevented by using the Copper Salt remedies.

"Anthracnose of the Bean" is described on page 164, Experimental Farms Report for 1892, and I am glad to state that the unsolicited experience of growers confirms the efficacy of the remedies outlined in that article. I may also say that recent experiments made by spraying the plants with Bordeaux mixture instead of soaking the seed in bluestone, have given equally satisfactory results.

"Blight of the Pear and Apple" has again wrought considerable injury to orchards in Eastern Ontario and Quebec. Orchardists are, however, recognizing the dangerous character of this disease, and are exercising more care in cutting out and destroying by fire affected branches or trees, as was recommended last year.

Fruit growers in British Columbia are experiencing considerable loss in their apple orchards, from a disease of the bark, the cause of which thus far is not clearly understood. Probably part of the bark injury attributed to this disease is due to what is known as "sunscald," a physiological effect of severe and sudden cold weather following a period of warm weather. The freezing of the sap causes expansion, accompanied by a rupture of the bark. Planting on northern and western slopes and growing low-headed trees will obviate this to a certain extent. Alkaline washes are also to be recommended and are valuable aids in keeping the bark in a healthy condition.

MEETINGS ATTENDED.

During the year I attended and gave addresses at the following meetings of a provincial character:—

In February, at Abbotsford, Que., the first meeting of the "Pomological Society and Fruit Growers' Association of the Province of Quebec," was held. I had the privilege of assisting in the organization of this body, which has since been generously recognized by the Provincial Legislature, and which bids fair to be of great value in furthering the fruit interests of the province.

The same society, at their annual meeting in the city of Quebec, December 10-11-12.

Meeting of the Ontario Fruit Growers' Association, at Orillia, December 4-5-6.

Agricultural Convention, at Charlottetown, P.E.I., Aug. 9, by invitation of the Dairy Commissioner for the Dominion, Professor J. W. Robertson.

Agricultural Convention for New Brunswick, held at Fredericton, August 16th, by invitation of the Dairy Commissioner for the Dominion.

Closing exercises of the Nova Scotia School of Horticulture, Wolfville, June 4th.

Farmer's institutes were also addressed as follows:—Coaticooke, Que.; Bell's Corners, Ont.; Metcalfe, Ont.; Richmond, Ont.; Manotick, Ont.; Cornwall, Ont.; Grimsby, Ont.

At all of these a lively and growing interest was shown, pointing to substantial horticultural advancement.

ACKNOWLEDGMENTS.

I beg gratefully to thank the secretaries and officers of the various Provincial Societies devoted to the fruit growing interests of the Dominion for valuable assistance and kindly encouragement received during the year. To Dr. B. D. Halsted, of New

Brunswick, New Jersey, I am much indebted for valuable aid in determining specimens illustrating various forms of plant diseases, and to correspondents generally for bringing under my notice the occurrence of these diseases in different parts of the country.

I have also to record with thanks the following donations :—

- W. R. Grace, Garden City, Kansas. Scions of plums and apricots ; currant cuttings.
- Miss E. M. Schantz, Zionsville, Pa. Apple scions.
- J. S. Breece, Fayetteville, N. C. "Critic" grape vines.
- Dr. R. B. Clark, Fay, Kansas. Grape vines.
- H. W. Hope, Paint, Ohio. "Upp" apple tree.
- G. J. Streator, Garrettsville, Ohio. Scions of black walnut.
- W. R. Dempsey, Trenton, Ont. Apple and pear scions.
- Toronto Pump Co., Toronto. Spraying pump.
- M. J. Graham, Dallas, Ia. Pear scions.
- W. M. Manning, Rockline, Mass. Shrub cuttings.
- Geo. Pepper, Pewaukee, Wis. Blackberry plants.
- G. Mills, Fairmount, N. Y. Seedling raspberries.
- Richard Trotter, Owen Sound, Ont. Plum scions.
- D. M. Bradt, Oswego, N. Y. "Hiram" raspberry.
- A. D. Barnes, Waupaca, Wis. Apple scions.
- M. Crawford, Cuyahoga, Ohio. New strawberries.
- John Fraser, Coaticooke, Que. Raspberry plants.
- G. H. Caughill, Aylmer, Que. Strawberry plants.
- Goold, Shapley, Muir Co., Brantford, Ont. Spraying pump.
- M. B. Brooks, Oak Point, N. Y. Knapsack pump.
- H. T. Curtiss, Ridgely, Md., U. S. Strawberry plants.
- H. F. Neumeyer, Macungie, Pa. Spraying nozzle.
- W. J. Kerr, Smith's Falls, Ont. Apple scions.
- W. Bailey, Billings Bridge, Ont. Cherry seedling.
- W. R. Latchford, Ottawa, Ont. Plum seedling.
- C. E. Brown, Yarmouth, N. S. Seeds of East Indian plants.
- Robert Whyte, Ottawa, Ont. Seedling raspberries.
- A. M. Smith, St. Catharines, Ont. Peach trees.
- Holmes & Holladay, Clarksburg, Ont. Spraying pump.
- Field Force Pump Co., Lockport, N. Y. Potato sprayer.

It gives me pleasure again to testify to the efficient service rendered by Mr. Wm. Taylor, foreman in this department, in carrying out the various branches of work committed to his care.

I have the honour to be, sir,
Your obedient servant,

JOHN CRAIG,
Horticulturist.

SPRAYING EXPERIMENTS.

No line of work associated with the successful culture of fruits at the present time, is charged with greater interest to the horticulturist than is the subject under consideration. It is also true that no other advance in horticultural practice has been so readily taken up by the more progressive and practical, nor more discussed by the theoretical and procrastinating class. Third and fourth classes may be made of those who have tried without success the remedies recommended, and those who disbelieve and have not tried. But honest doubt should always be respected.

Again, there are few, if any, operations now included in the annual programme of the fruit grower whose success is so dependent on conditions practically outside the control of the operator than is spraying. Meteorological conditions, as rain and wind, heat and cold, bear a marked influence on the results, and often discourage a beginner from carrying into practice good resolutions formed at the opening of the season. An unfavourable season will so frequently mar the effect of conscientious effort as to place in doubt the beneficial results, thus shaking the confidence of the beginner.

Before going into the subject proper, namely, the result of the season's work, it might prove interesting to preface it with a brief history of the introduction of the practice of spraying.

In 1882 Professor Millardet, an eminent botanist, of Bordeaux, France, had his attention called to the fact that grape vines sprinkled with a mixture of bluestone and lime to deter the inroads of boys and vagrants, were much less attacked by mildew than other vines not so treated. Acting on the suggestion conveyed by this object lesson, he carried on experiments during 1883 and 1884, and gave to the public the result of his work on May 1st, 1885. As Mr. Fairchild, of the Department of Agriculture, Washington, says in an excellent article recently published on Bordeaux Mixture as a fungicide, "It appears that to Millardet is due the credit of first correctly interpreting the immunity, shown by the treated vines in Medoc, and of conceiving a practical method by which copper sulphate could be used as a remedy for the disease in question."

The news of this discovery was soon chronicled in America, the bulletins of recommendations were issued by the Department of Agriculture at Washington and the California Experiment Station early in 1886. The following two years gave to the public the results of experiments conducted in the United States, and established a formula for Bordeaux mixture which has been more or less generally accepted and has become in a measure, a standard. This formula was recommended by Mr. Galloway, Chief of the Division of Vegetable Pathology, at Washington, D.C., and consisted of 6 pounds of copper sulphate and 4 pounds of lime in 22 gallons of water. The first formula, however, was much stronger than this and contained 18 pounds of copper sulphate and about 30 pounds of lime to which was added 30 gallons of water. Such a mixture resembled a thick paste and was applied by means of wisps of straw or brooms. Many other mixtures were soon introduced and tried by the active American scientists principally on account of the difficulty of applying the concentrated form of Bordeaux mixture. In the spring of 1890, the first year of the appointment of the writer as Horticulturist to the Central Experimental Farm, Ottawa, experiments were planned and carried out in orchards at Abbotsford, Quebec. The experiments were designed to show the benefit of spraying with ammoniacal copper carbonate in varying proportions, copper sulphate of varying strength, and the value of hyposulphite of soda as a fungicide. The variety of apple treated was Fameuse and the results gained demonstrated the profit of spraying with ammoniacal copper carbonate of the strength since recommended by the Horticultural Division of the Experimental Farm. Experiments have been continued each year up to the present, but marked with more or less success according to the character of the season. In the initial stages of this work the important questions of economy and ease of application, in addition to the effectiveness had to be studied by

the experimenter so that a remedy when discovered might be practicable and thus commend itself generally to the public.

These experiments covered the trials of over thirty spraying mixtures, and among the fruits included were apple, pear, plum, cherry, peach, and the majority of the small fruits.

Owing to the difficulty of applying and the cost of making the concentrated Bordeaux mixture, many other copper salt compounds have been tested, with the result that many were discarded, while a few were recommended for trial. Copper sulphate, or bluestone, having entered into all mixtures giving favourable results, the number of formulæ recommended have gradually lessened with each year's experience till at the present time, while we have yet much to learn, the fruit grower need not burden his mind with a bewildering array of receipts or formulæ, almost as numerous as the legion of enemies which attack his orchards and vineyards.

As a result of experiments conducted in 1892, the writer recommended a modified formula for the preparation of Bordeaux mixture. This was given to the public by means of bulletins and circulars during 1892 and 1893. The formula is as follows:—4 pounds of copper sulphate, 4 pounds of lime and 50 gallons of water. The cost of this need not exceed one-half cent per gallon, and admits of the addition and application of Paris green at the same time, and coupled with this was ammoniacal copper carbonate, which will not be used as freely as Bordeaux mixture on account of its greater cost and the increased labour of preparing it. For spraying late in the season, when stains on the fruit are undesirable, it is the most useful agent yet discovered. In copper sulphate we have the base or foundation of both the above mixtures, and a very effective fungicide to apply *before the foliage appears*. With this trio, backed up by intelligence and perseverance, the fruit-grower may largely increase the revenue derived from his orchard.

EXPERIMENTAL WORK IN 1894.

Through the co-operation of the Fruit Growers' Association of Ontario, it is believed that the value of this work has received such an emphatic confirmation that the resulting impetus will place the practice of spraying to lessen fungous injury, as well as insect attacks, on a plane well out of the reach of controversy. While the benefits arising from the practice have been satisfactorily proved by the writer, as well as by leading fruit-growers, and the system strongly advocated, yet conflicting results obtained here and there continually threw a dark shadow and gave rise to doubt and discussion. This, I am happy to say, culminated in a resolution moved by the retiring President of the Ontario Fruit Growers Association, Mr. A. H. Pettit, at the meeting of the society, held at Peterborough, December, 1893. This resolution read as follows:—"That in the opinion of this meeting it is desirable that the Director of the Experimental Farms be requested to make during the coming season at several centres of fruit culture a public practical test of the efficacy of the solutions recommended for the prevention of the scab on apples." On recommendation of the Director, the Minister of Agriculture, for the Dominion, recognizing the important interests involved, was pleased to authorize the initiation of the work. Experiments were instituted at seven different centres in the Grimsby and St. Catharines districts. It is a pleasure to record the cordial spirit of co-operation manifested by the fruit growers of the Grimsby and St. Catharines districts and the helpful manner in which they facilitated the progress of the work. The inauguration of the experiments was unavoidably delayed till May 1st, which, on account of the abnormally early spring, was fully two weeks later than desirable. This, followed by the unprecedented and continuous rains during May and June, coupled with the scorching heat and drought of midsummer and autumn, all combined to form a season with conditions most unfavourable to obtaining even average results. Regarding the character of the weather, Mr. Wm. Orr, of Stoney Creek, Ont., writing under date of June 18th, says: We have been labouring under almost unsurmountable difficulties in trying to carry out our spraying programme. It has rained every day, with

one exception, for twenty-one days, and ploughed ground has been like a mortar bed. It has even been impossible to get upon well under-drained land part of the time." The same condition of affairs is chronicled by Messrs. M. Pettit, A. H. Pettit, C. P. Carpenter and E. J. Woolverton, in the Grimsby district. Writing from St. Catharines, under date of June 15, Mr. M. Burrell, says "that owing to the disastrous weather we have been at a standstill. For more than two weeks it has been raining daily, and not only has all farm work been suspended, but spraying operations have been impossible an account of the softness of the ground."

Mr. A. H. Pettit says, on June 20th: "We shall again go to spraying as soon as we can float a wagon with the barrel in it."

Following on the heels of the downpour came a period of ideal weather for the development of fungous growth. Never, to my knowledge, has the apple scab fungus (*Fusicladium*) appeared in such a virulent form. The fungus coming before the fruit had much more than formed, attacked the foliage so severely as to cause it to resemble and be easily mistaken for the ordinary twig blight. In many districts apple trees presented a scorched and browned appearance as if suffering from blight and severe drought. Most varieties lost a large proportion of their leaves, which of course resulted in a corresponding loss of the fruit. This visitation, however, had the effect of emphasizing the value of spraying as a factor having an important bearing on increasing the yield in seasons of severe fungous visitation, as well as improving the quality of the fruit. I mention this now to elucidate the apparent discrepancy in the yields of treated and untreated trees. To sum up briefly, untreated trees lost their foliage and consequently their crop of fruit. Spraying prevented the growth of the fungus on the foliage which was thereby retained and with it a large proportion of the fruit. These are points worth remembering. Peaches, cherries and plums were treated with the two-fold object of preventing loss from a fungous disease causing the fruit to rot on the tree, and insect attacks. Apples and pears to prevent injury from scab and spot (*Fusicladium*) and insect pests. The results owing to the difficulties outlined above, were not conclusive in every instance; this was reasonable in consideration that in one or two cases no spraying was done between May 4th and June 5th, owing to the continuous rainfall. Another cause affecting the completeness of the report was the failure of some of the experimenters in the hurry of marketing operations to record carefully the yields of the sprayed and unsprayed trees. Writing of this phase of the question one of the Committee very sensibly remarks that "there seems to be a little difficulty in getting reliable statistics as to numbers, weights, &c. When the exact moment arrives for counting specimens and weighing fruit the experimenter will probably be so rushed with other work that the details of the experiment may be neglected and the value of the whole test seriously impaired."

However, I am pleased to state, that the records which have been secured, are sufficiently convincing of themselves to be entirely satisfactory, although it is to be regretted that full returns could not be obtained in every case.

PEACHES.

Experiments mainly designed to prevent rot and leaf-curl were carried on in the orchards of Messrs. J. H. Broderick and Eli Gregory & Son, of St. Catharines, Ont., with the help of these gentlemen and the kind co-operation of Mr. Burrell.

The trees should have been sprayed according to the programme outlined in the accompanying calendar, but owing to the earliness of the season they were too far advanced to risk the application of copper sulphate. Treatment accordingly began on May 1st, with Bordeaux mixture: four pounds of copper sulphate, four pounds of lime to 50 gallons of water. The second application was made on May 15th. Three ounces of Paris green were added to each barrel of mixture. The trees were treated again on June 4th, June 20th, and July 5th. On account of some indications of injury to the foliage the formula was weakened for the last two applications, to three pounds each of copper sulphate and lime and the same quantity of water. Up to July 5th, rain was more or less constant. On July 31st, Mr. Burrell reported that there seemed

to be no difference between sprayed and unsprayed trees in the number of peaches affected by curculio. In regard to rot: "Early Rivers" showed 2 to 4 per cent rotten on sprayed trees and 5 to 7 per cent. on unsprayed trees. At this time the fruit was beginning to colour. The spot fungous (*cladosporium*) was considerably worse on unsprayed trees. On August 7th, "Early Rivers" showed about six per cent of rotten fruit on sprayed trees and eight per cent on unsprayed trees. "Early Richmond" gave approximately the same results. As the crop was excessively heavy the amount of affected fruit even on unsprayed trees could not be regarded as harmful, owing to the beneficial effects accruing from this thinning process. In fact the quality of the crop would have been much improved by removing at least 30 per cent of the fruit which set, a large proportion of which was allowed to mature.

With regard to the leaf curl, there was none on the treated trees and scarcely a sign of it throughout the orchard. Mr. Burrell noted at harvesting time that in all cases the fruit on the sprayed trees was higher coloured than that on the untreated trees. This was undoubtedly due to the absence of the spot fungus already referred to as *Cladosporium*.

The crop of peaches in Mr. Gregory's orchard was also uniformly large, and of good quality throughout. So little apparent difference could be noticed that picking records were not preserved. My own notes taken on 26th June and 29th August indicate that there was less rot on the sprayed trees among the early varieties such as Rivers, Mountain, Rose and Crawford.

To sum up, experiments on peaches were not attended by marked results owing to the absence in a large measure of fungous diseases, and the presence of an unusually heavy crop of fruit. From the experience of the past season it appears desirable to apply even a weaker formula of Bordeaux than that recommended, and it is suggested that after the foliage has appeared 3 pounds each of copper sulphate and lime to 50 gallons of water, be used. This formula might be used in treating all stone fruits, although cherries were not injured by the ordinary formula.

PLUMS.

I am glad to be able to report more definite results regarding the treatment of plums. In Mr. Broderick's orchard a block of plums composed of Munro, Bradshaw and Lombard, was selected, and a part of each sprayed on the dates already given. The trees were young, just coming into bearing. Rot was more or less prevalent on all varieties, but the greatest damage to the trees was wrought by the Shot-Hole fungus (*Septoria cerasina*), and in preventing this disease the best results were obtained. Fruit growers well know the effect on the fruit of the loss of the foliage previous to the harvesting period—decreased size and poor colouring are sure to follow.

Notes taken on 26th June and 29th August emphasize the fact that the foliage of the sprayed trees was vastly superior to the unsprayed. In walking through the orchard the difference in the health and luxuriance of the two series at once made itself apparent.

To obtain accurate data regarding the character of the fruit two trees were selected as much alike as possible in every respect, one sprayed, the other unsprayed. The fruit of each was gathered and weighed. The sprayed tree yielded $14\frac{1}{4}$ pounds of sound plums, the unsprayed 12 pounds. But the difference was most noticeable in the superior size and quality of the fruit from the sprayed tree. A hundred plums from this tree weighed three pounds and nine ounces, while 100 plums unsprayed, weighed two pounds and one ounce.

The sprayed plums would easily sell as good first, while the unsprayed owing to small size and lack of colour, could hardly be classed as "seconds."

Touching the treatment of plums, Mr. Wm. Orr, of Stoney Creek, Ont., writes as follows:—"Other years we have lost heavily from rot, especially on Duane's Purple and Pond's Seedling, frequently losing the greater part of the crop of these varieties. This year the trees were heavily loaded with fine clean fruit which was marketed without any serious loss from rot. The check trees of Pond's Seedling dropped their

fruit early in the season, and the checks of Duane's Purple rotted considerably, although not so badly as they did some other years."

In connection, Mr. Orr states that "he found spraying with Paris green effectual in destroying the curculio."

Mr. Burrell, of St. Catharines, also writes that he had two rows of bearing plum trees, the end tree of each row being left unsprayed. On October 22nd when these two untreated trees were practically bare of foliage the rest were looking green and thick with leaves. I may say in this connection that the Experimental Farm plum orchard, made up of some 75 varieties, including many varieties of *Prunus Americana*, has been kept entirely free from rot by the persistent application of Bordeaux mixture each year in conjunction with Paris green to prevent curculio attacks. Native plums in the vicinity of Ottawa have for the past three years been a failure owing to rot (*Monilia*) and the spot-disease (*Cladosporium*.) In my opinion, no plum grower can afford to omit spraying with Bordeaux mixture and Paris green.

CHERRIES.

Experiments for the prevention of rot were carried out in the orchards of Messrs. Broderick and Gregory of St. Catharines, Ont., and E. J. Woolverton, of Grimsby, Ont.

Spraying began with Bordeaux mixture on May 1st, when the blossoms were beginning to open. Three additional applications were made with the same mixture with the addition of Paris green. Records of yields were obtainable from Messrs. Broderick and Woolverton. The former gives the yields of two trees of Yellow Spanish as nearly alike in every respect as possible at the beginning of the season.

Sprayed tree yielded	90 pounds of sound fruit.
Unsprayed " "	30 " "

Mr. Broderick adds that the lower branches of the treated tree were well loaded with sound fruit, while there were a good many cherries at the top of the tree which was not thoroughly covered in spraying. This emphasizes the necessity of great care in applying the fungicide to all parts of the tree.

Mr. Woolverton's results were rather startling in their emphatic conclusiveness. He reports as follows:—"Gave cherries three applications of Bordeaux mixture with four ounces of Paris green to 50 gallons of water on the following dates, blossoms having fallen, May 10th, May 26th and June 4th, also one application of Ammoniacal Copper Carbonate on July 4th." Note; June 4th "cherries already show good results; the tree left unsprayed is much inferior in fruit and foliage to the one treated."

July 9th. "Picked fruit on unsprayed tree, yield, 17 pounds." July 10th. "Picked part of fruit off sprayed tree, amounting to 112 pounds; the remainder not quite ripe." July 17th. "Picked remainder of fruit on sprayed tree, 18 pounds; total yield, 130 pounds."

"Spraying cherry trees with Bordeaux mixture not only prevents rot, but seems to prolong the growing season, as will be seen from the above dates of picking." He further says that the advantage from spraying these trees is apparent from the following figures which are absolutely correct. Cherries from sprayed trees netted \$9.25, and were a choice sample. Cherries from unsprayed trees netted \$1.20, and were a medium sample.

These are actual results, obtained from two large trees, the advantage being on the side of the unsprayed, in point of size of tree and bearing capacity, at the time spraying began. One of the lessons this teaches is that in the case of cherries early spraying—that is, before the buds start—is not so important as the thorough and frequent application of the fungicide during the growing period of the fruit.

PEARS.

The spotting and cracking of early pears, notably, the Flemish Beauty, has for the past few years been a source of great loss to fruit growers. Strong evidence on this

subject was submitted by Mr. Orr of Stoney Creek, at the meeting of the Ontario Fruit Growers' Association at Peterboro'. He also reported failure in preventing the disease by spraying with Bordeaux mixture. The orchard referred to was one of those selected for experiment this year, but unfortunately owing to the following reasons given by Mr. Orr, no definite results were obtained. He says: "Owing to an extremely wet June, it was impossible to carry out the experiments thoroughly or as we should like to have done. The severe drought in mid-summer seriously impaired the quality and size of the fruit. The soil, being heavy clay, felt the effects of the dry weather most keenly. A heavy wind storm occurred before harvesting time and blew off the more or less prematurely ripened fruit, which at this time was unfit for market. It was therefore impossible to estimate the value of the work done on pears."

Notes taken on 1st September, indicate that as far as it was possible to judge by appearances the sprayed trees carried more and better fruit, and had much better foliage than those untreated. On the matter of pears we have, however, interesting evidence from Mr. M. Pettit, of Winona. Although experiencing much inconvenience from continuous rainfall he reported on 26th May that "on looking over the sprayed and unsprayed he could see quite a difference in favour of the sprayed trees. The Beurré Giffard and Flemish Beauty unsprayed showed considerable fungus, both on leaf and fruit, while on the sprayed trees there is scarcely any to be found. I also think there is more fruit on the sprayed trees."

Writing again under date of 7th November, Mr. Pettit says, "regarding the yield of pears, I am unable to give you exact figures, but I think the sprayed trees of Flemish Beauty had fully 75 per cent more fruit than those not sprayed. Beurré Giffard trees sprayed twice before blooming and regularly afterwards, were loaded with perfectly clean fruit, while trees of the same variety not sprayed until the fungus appeared—which was very soon after the pears had formed, on 29th May and 9th June—were almost entirely destroyed. There was not much difference in the Bartlett's sprayed, and unsprayed as they were all a good clean sample this year."

The trees were sprayed with copper sulphate on 16th April, Bordeaux mixture on 4th, 15th and 29th May and 13th and 29th June. Paris green was added in the later sprayings. The best proof of Mr. Pettit's belief in the work is his statement that he fully intends to spray thoroughly next year. He also concludes as a result of the season's experiments on pears, that two sprayings before the blooming period are of more value and have more effect than four sprayings after that period.

The orchard of Mr. E. J. Woolverton also provided a striking example of the effect of Bordeaux mixture upon Flemish Beauty pears. Of two young trees of this variety standing alongside each other in the same row one was sprayed, the other not treated. On 29th August the sprayed tree was clothed with luxuriant foliage and carried an average crop of clean fruit, while its neighbour, the unsprayed, had lost fully 25 per cent of its leaves and was almost bare of fruit. The result at harvest time was a bushel of good pears on the one hand and a few inferior specimens on the other.

Let us conclude then that the "cracking and spotting" of the pear may be prevented with great benefit to the tree and fruit by the timely application of Bordeaux mixture, and that in treating these diseases the early applications are most important.

APPLES.

It is gratifying to be able to record results which cannot be accepted otherwise than as absolutely conclusive, in connection with perhaps the most important class of fruit which entered into the experiment, viz., apples.

The unusual difficulties and hindrances encountered make the results all the more emphatic and valuable. The work also should have been commenced at least ten days earlier than it was begun, and the first spraying should have been made with copper sulphate. This is in line with the experience of Mr. Murray Pettit.

An interesting experiment was planned and inaugurated in the extensive apple orchard of Mr. C. P. Carpenter, but was not carried out owing to the conditions of the

ground, it being so soft as to preclude the possibility of getting horses into the orchard. Thirty-two days elapsed between the first and second sprayings, but the benefit of the first application could easily be seen in August on the foliage of Greening, Colvert, Spy and Early Harvest. Mr. Carpenter also noticed an improvement in the quality of Northern Spy.

The results gained by Messrs. M. Pettit, E. J. Woolverton and A. H. Pettit, are given in detail in the accompanying tabulated statement.

In submitting his results Mr. M. Pettit says that the "Snow apples were not quite free of fungus, but much better than last season. Spys were much improved, while the test on Baldwins was a great success."

Mr. E. J. Woolverton, writing under date of October 25th, says: "I have no doubt that, had the experimental plots received an application of copper sulphate earlier in the season, the results would have been still more satisfactory; but even now after all the fruit is picked it is an easy matter to pick out the treated trees from the untreated owing to the much richer and more healthy character of their foliage."

Mr. A. H. Pettit, at one time indifferent in regard to the value of spraying, and who deserves my best thanks, not only for inciting the movement, but for most faithfully and conscientiously carrying out under extreme difficulty the entire plan of the experiment, as originally laid down, writes as follows:—

"I now inclose you a statement of the result of the spraying experiment with *Bordeaux mixture* conducted in my orchard under your direction during the past season. And in doing so I must express my great satisfaction in the results obtained. It has shown the effects in such marked degree.

"The experiment you conducted here this season has demonstrated to me, and many other fruit growers, that spraying with Bordeaux properly applied and at regular intervals will be of great practical value in destroying the fungus that is, I believe, causing the unfruitfulness of our orchards. The sprayed trees, aside from the largely increased crop, presented a fine healthy foliage, while those by the side of them, unsprayed, showed a very unhealthy appearance and no fruit.

"I might add that while the fruit on the sprayed trees was of good size and colour, it was not entirely free from damage by the Codling Moth; and two or three varieties, notably the American Golden Russet, Fameuse and Swaar were affected by a scab to quite an extent. Now, this may have taken root during our excessive wet weather a few days after the first spraying. I am also inclined to think, although I have no means of knowing it to be so, that the Bordeaux mixture does to some extent destroy the action of the Paris green. Had it not been for the work of the Codling Moth, the percentage of first quality would have been greater.

"Now, I may go a little beyond the experiment proper. Having sprayed a number of trees to a greater or less extent, the season, as you are aware, was most unfavourable in some respects, not only for spraying regularly, but for the cultivation of the orchard and vineyard, the extreme wet, followed by the rapid drying up of the land. I was pressed for time to get what spraying I did get done (beyond the experiment proper) with any regularity, and some were done moderately well, while other parts were not done so well; but I can distinctly trace the good effects of the application in the increased production and also in the improved condition of the foliage, even to the extent of one side of quite a number of the trees producing good results and good foliage on the side sprayed, while the other side of the tree was barren of fruit and carried unhealthy foliage.

"I believe, sir, that the value of this experiment so practically demonstrated will give a wonderful inspiration to our fruit growers to fight straight along this line, and I trust your report will be as convincing and as widely distributed as possible, in order that every fruit grower may reap the reward of your and your associates' researches and experiments to destroy the insects and diseases that are affecting our fruit trees and fruits, and I trust if there are any other doubting fruit growers as to the benefit of spraying, you will convert them at once, even should it be the means of flooding the universe with clean, choice Canadian fruit."

The orchards from which the most complete returns have been received are those of Mr. E. J. Woolverton and A. H. Pettit, of Grimsby, Ont. Tables I. and II. show

the varieties treated and the percentage of yield of fruit of the different grades after being carefully sorted. Mr. Woolverton's table also shows the relative percentage of windfalls in both series. Having these figures, the deductions which appear in Tables III. to X. inclusive, are drawn therefrom in order to present the results in a clearer and more convincing manner. In Table XI. is presented the combined and averaged results of all experiments, and the percentage of gain in yield of fruit of the sprayed over the unsprayed trees. This table shows that the sprayed trees yielded 24 per cent more of first-class fruit and 6 per cent and 18 per cent less, respectively, of second and third class.

The effect of the improvement *in quality alone* upon the gross receipts from an acre of bearing apple trees may be shown as follows:—Supposing the yield to be 50 barrels, we find according to results gained that spraying would give us \$56.75 worth of No. 1 fruit, \$31.50 worth of seconds, and \$6.97 of thirds, or a total of \$95.22 per acre. The same unsprayed would give No. 1 fruit \$26.75 worth, \$37 worth of seconds and \$13.64 worth of thirds, or a total of \$77.40, leaving a balance of \$17.82 in favour of the sprayed per acre. This is also supposing that all the "seconds" and "thirds" could be disposed of, which is very problematical. The cost of spraying an acre of apple trees five times with dilute Bordeaux mixture need not exceed \$6.00 and may be under \$5.00; there should be a net profit of \$10.00 on the basis of equal yields, but improved quality. But as a result of these experiments, and looking now at spraying *as affecting the yield*, we find that the sprayed trees gave 74.14 per cent of the total yield, this return added to the improved quality of the fruit, gives a difference in the net receipts of \$51.53 in favour of the sprayed acre. I do not think this side of the argument need be pushed farther, though it would probably prove interesting to know the effect of this on the crop of the province. Each grower will find it to his interest, however, to make a calculation for his own satisfaction on this basis.

EQUIPMENTS FOR SPRAYING.

Where the area to be sprayed exceeds 15 acres it will probably pay to buy a horse power pump. These are now made by several firms dealing in force pumps. One which I have used with satisfaction at Ottawa during the past season was purchased from the Field Force Pump Co., of Lockport, N. Y.

Where a barrel is used—and I may say that one of these will answer the requirements of all having 15 acres or less to spray—a strong force pump should be secured. The valves and inside working parts should be of brass, the metal chambers and all castings strong and heavy, and the packing of the most durable character. Nothing is more annoying, and nothing acts more as deterrent to the introduction of the practice of spraying, than the "breakdowns" which occur with irritating frequency at the beginning of the work each year. This matter has been represented so strongly to Canadian firms that I believe satisfactory pumps will be forthcoming next season. I have used with good results pumps manufactured by the Toronto Pump Co., and the Gould, Shapley, Muir Co., of Brantford, Ont., although the first "Ideal" pumps manufactured by the latter firm showed defect under strong pressure, these, I believe, have been remedied. Holmes and Holladay, Clarksburg, Ont., also manufacture a strong force pump suitable for fitting into a barrel. Each pump should be supplied with two lines of hose, the lengths proportionate to the height of the trees, and each hose fitted with a stop-cock. In cases of clogging the stop-cock will always be appreciated. The nozzles which gave greatest satisfaction were the "Vermorel" and the "McGowen," the latter is most economical of fluid and should be used exclusively when the trees are small, or upon the lower branches. The McGowen is a valuable instrument for carrying the liquid to the upper branches with a minimum degree of waste. A bamboo pole, through which a brass tube may be inserted, is an improvement over an ordinary pole for the purpose of elevating the nozzle. I wish to impress upon fruit growers the desirability of beginning the season's work with apparatus fully equipped and in good working order, as the ease with which the applications are made influences to a large extent the thoroughness of the work, and upon the thoroughness will depend in a large measure the success attending the undertaking.

PREPARATION OF BORDEAUX MIXTURE.

The ingredients are copper sulphate, lime and water. A good quality of copper sulphate should be secured. As pointed out by Mr. Fairchild, a brand which contains a large amount of iron or zinc sulphate should not be used, although it has not been proved that these ingredients actually injure the mixture. He further states that lime which is made from stone containing a large amount of clay is likely to be what is known as "dead" lime, and to contain small insoluble granules. This kind of lime may be used, but is likely to give trouble by clogging the nozzle unless the resulting milk be well strained before adding it to the copper sulphate. Lime which is air-slacked should not be employed in any case since its use results in injury to the foliage. The method of preparing the mixture has so often been described that I need not again repeat the directions.

Where large orchard areas are under treatment the work of preparing Bordeaux mixture may be greatly lessened by making at the beginning of the season stock solutions of copper sulphate, and lime, which may be diluted as needed. Dissolve 100 pounds of copper sulphate in 50 gallons of water, and each two gallons when stirred will contain 4 pounds of the salt. In another barrel slake 100 pounds of lime and make up to a milk by adding 50 gallons of water. Each gallon should contain 2 pounds of lime. Where it is desired to make a barrel of Bordeaux mixture, take 2 gallons of the stock solution of copper sulphate and add a sufficient quantity of the milk of lime to neutralize it completely. If the lime is of good quality two gallons of the well stirred stock solution will be sufficient. If the lime is of poor quality the proper quantity will be shown by the ferrocyanide of potassium test. If the lime is deficient a drop of the ferrocyanide of potassium added to the mixture will turn brown. Add lime water till the ferrocyanide remains colourless.

Spraying with Bordeaux mixture is a practice which has come to stay, at least till a more effective agent is discovered. The work of the season demonstrates the fact that it is efficacious and profitable in proportion as it is thoroughly and perseveringly practised.

TABLE I.

SHOWING Variety Treated and Percentage of Yield of Fruit of the different Grades.
E. J. WOOLVERTON.

Variety of Apple.	How Treated.	Firsts.	Seconds.	Thirds.
		Per cent.	Per cent.	Per cent.
Golden Russet.....	Sprayed, handpicked.....	36.07	34.86	29.05
do	do windfall.....		49.09	50.90
do	Unsprayed, handpicked.....	7.89	52.63	39.48
do	do windfall.....		15.00	85.00
Baldwin.....	Sprayed, handpicked.....	80.43	19.56	
do	do windfall.....		70.83	29.16
do	Unsprayed, handpicked.....			
Greening.....	Sprayed do	55.61	29.75	14.63
do	do windfall.....		34.70	65.30
do	Unsprayed, handpicked.....		100.00	
Northern Spy.....	Sprayed do	52.25	41.08	6.66
do	do windfall.....		71.42	27.58
do	Unsprayed, handpicked.....	11.83	42.40	45.76
do	do windfall.....			100.00
Cranberry Pippin.....	Sprayed, handpicked.....	17.04	56.12	26.84
do	do windfall.....		36.66	63.34
do	Unsprayed, handpicked.....	2.48	58.70	38.82
do	do windfall.....		36.00	64.00
Spitzenberg.....	Sprayed, handpicked.....	51.15	41.86	6.99
do	do windfall.....		52.63	47.37
do	do handpicked	50.00	50.00	
do	Unsprayed.....	None.	None.	None.

TABLE II.

A. H. PETTIT.

Variety of Apple.	How Treated.	Firsts.	Seconds.	Thirds.
		Per cent.	Per cent.	Per cent.
Blenheim Pippin.....	Sprayed	80.00	20.00	.....
do	Unsprayed.....	25.00	53.57	21.42
Baldwin.....	Sprayed.....	75.32	14.34	10.33
do	Unsprayed.....	.....	.....	.....
Greening.....	Sprayed	69.96	20.72	9.32
do	Unsprayed.....	13.33	36.00	50.67
Red Astrachan.....	Sprayed	54.29	28.96	16.75
do	Unsprayed.....	30.11	29.89	40.00
American G. Russet.....	Sprayed	40.00	40.00	20.00
do	Unsprayed.....	27.27	54.54	18.18
Swaar.....	Sprayed	28.40	56.80	14.79
do	Unsprayed.....	.....	100.00	.....
Alexander.....	Sprayed	77.14	17.14	5.71
do	Unsprayed.....	58.06	29.03	12.90

MURRAY PETTIT.

Variety of Apple.	How Treated.	Firsts.	Seconds.	Thirds.
		Per cent.	Per cent.	Per cent.
Baldwin.....	Sprayed.....	69.70	30.30	.....
do	Unsprayed.....	27.18	72.82	.....

TABLE III.

E. J. WOOLVERTON.

SHOWING ratio of Yield of the three grades of fruit.

Sprayed trees	yielded 94.40	per cent of the whole of the firsts.	
Unsprayed trees	" 5.60	" " " "	
Sprayed trees	" 65.90	" " " seconds.	
Unsprayed trees	" 34.10	" " " "	
Sprayed trees	" 60.22	" " " thirds.	
Unsprayed trees	" 39.78	" " " "	

TABLE IV.

A. H. PETTIT.

SHOWING ratio of Yield of the three grades of fruit.

Sprayed trees	yielded 86.05	per cent of the whole of the firsts.	
Unsprayed trees	" 13.95	" " " "	
Sprayed trees	" 75.54	" " " seconds.	
Unsprayed trees	" 24.46	" " " "	
Sprayed trees	" 65.08	" " " thirds.	
Unsprayed trees	" 34.95	" " " "	

TABLE V.

E. J. WOOLVERTON.

SHOWING percentage of Yield from varieties, sprayed and unsprayed.

Variety of Apple.	How Treated.	Per cent of Yield.
Golden Russet.....	Sprayed..	80·13
“ “.....	Unsprayed.....	19·86
Baldwin.....	Sprayed.....	100·00
“ “.....	Unsprayed.....	
Greening.....	Sprayed.....	93·90
“ “.....	Unsprayed.....	6·09
Northern Spy.....	Sprayed.....	65·90
“ “.....	Unsprayed.....	34·09
Cranberry Pippin.....	Sprayed.....	67·94
“ “.....	Unsprayed.....	32·05
Spitzenberg.....	Sprayed.....	100·00
“ “.....	Unsprayed.....	

TABLE VI.

A. H. PETTIT.

SHOWING percentage of Yield from varieties, sprayed and unsprayed.

Variety of Apple.	How Treated.	Per cent of Yield.
Blenheim Pippin.....	Sprayed.....	51·72
“ “.....	Unsprayed.....	48·28
Baldwin.....	Sprayed.....	100·00
“ “.....	Unsprayed.....	
Greening.....	Sprayed.....	97·05
“ “.....	Unsprayed.....	2·95
Red Astrachan.....	Sprayed.....	75·71
“ “.....	Unsprayed.....	24·29
American Golden Russet.....	Sprayed.....	73·17
“ “ “.....	Unsprayed.....	26·83
Swaar.....	Sprayed.....	98·83
“ “.....	Unsprayed.....	1·17
Alexander.....	Sprayed.....	69·30
“ “.....	Unsprayed.....	30·70

TABLE VII.

E. J. WOOLVERTON.

RESULTS from all varieties, averaged.

	Firsts.	Seconds.	Thirds.
	Per cent.	Per cent.	Per cent.
Sprayed trees gave.....	31·77	44·53	23·69
Unsprayed trees gave.....	5·40	49·70	44·90

TABLE VIII.

A. H. PETTIT.

RESULTS from all varieties averaged.

	Firsts.	Seconds.	Thirds.
	Per cent.	Per cent.	Per cent.
Sprayed trees gave.....	59·07	27·36	13·57
Unsprayed trees gave.....	36·98	35·07	27·94

TABLE IX.

E. J. WOOLVERTON.

Sprayed trees gave 74·14 per cent of the total yield.
Unsprayed “ 25·85 “ “

TABLE X.

A. H. PETTIT.

Sprayed trees gave 79·43 per cent of the total yield.
Unsprayed “ 20·57 “ “

SHOWING average returns from the different Experimenters.

Variety.	How Treated.	GRADE OF FRUIT.		
		First.	Second.	Third.
		Per cent.	Per cent.	Per cent.
A. G. Russet.....	Sprayed.....	38·03	37·43	24·53
do.....	Unsprayed.....	17·58	53·58	28·83
Baldwin.....	Sprayed.....	75·15	21·40	3·44
do.....	Unsprayed.....	25·81	74·19	.....
Greening.....	Sprayed.....	62·79	25·23	12·97
do.....	Unsprayed.....	6·66	35·35	57·99
Northern Spy.....	Sprayed.....	52·25	41·08	6·66
do.....	Unsprayed.....	11·83	42·40	45·76
Average.....	Sprayed.....	57·00	28·00	11·00
do.....	Unsprayed.....	18·00	51·00	33·00

RETURNS from all varieties averaged.

How Treated.	GRADE.		
	First.	Second.	Third.
	Per cent.	Per cent.	Per cent.
Sprayed.....	45·42	35·94	18·63
Unsprayed.....	21·42	42·38	36·42

AN EXPERIMENT TO PROVE THE EFFICACY OF PARIS GREEN WHEN APPLIED WITH BORDEAUX MIXTURE.

This simple experiment was suggested by fruit growers, who, having used the combined fungicide and insecticide, found at harvesting time a comparatively large percentage of wormy fruit, this led them to suspect that the Bordeaux mixture exercised a weakening influence on the toxical qualities of the arsenic, or, combined with it in such a manner as to render the arsenic comparatively innocuous to insects.

On this point Mr. A. H. Pettit in submitting his report on spraying experiments, says: "I am inclined to think though I have no means of knowing it to be so, that the Bordeaux mixture does to some extent destroy the action of Paris green, otherwise the percentage of fruit of first quality would have been much larger." The unusual amount of wormy fruit, however, may undoubtedly be attributed to the presence of a second brood of Codling Moth, which occurred in Grimsby during this season. This occurrence is discussed by Mr. Fletcher in the report of the Entomologist.

The chemical action consequent upon the addition of Paris green to Bordeaux mixture is discussed by Mr. Shutt, who also gives the results of laboratory experiments. The conclusions reached are quite in line with results gained from practical trials in the orchard, which may be described as follows:—

Two trees each of three varieties of crabs were selected, all promising a heavy crop of fruit. Immediately after the blossoms had fallen one tree of each variety was sprayed with Bordeaux mixture to which was added 4 ounces of Paris green, one additional application was given two weeks later. The remaining tree of each variety was sprayed with Paris green in water in the same proportion and on the same dates that is, 1 lb. to 200 gallons. The fruit was picked in the autumn, windfalls being kept distinct from the hand-picked. The number of wormy fruits in each case, separated and counted. The results are given in detail in the following table:—

SHOWING Percentage of Wormy Fruit under both Treatments.

Variety.	How Treated.	Grade of Fruit.	Percentage Wormy.	Averages.
<i>Crabs.</i>				
Orange	Paris green	Handpicked	8	}
	Bordeaux mix.			
do	Paris green	Windfalls.	8·03	}
	Bordeaux mix.			
do	Paris green	Handpicked	2·66	}
do	do	Windfalls.	20·13	
Hyslop	Bordeaux mix.	Handpicked	9·55	}
	Paris green			
do	Paris green	Windfalls.	20·65	}
do	do	Handpicked	11·76	
do	do	Windfalls.	15·67	}
Quaker Beauty	Bordeaux mix.	Handpicked	6·72	
do	Paris green		}	
do	Paris green	Windfalls.		15·00
do	do	Handpicked	11·82	
do	do	Windfalls.	20·81	}
Average of all treated with Paris green . . . . .					13·80
do	do	Bordeaux mixture.		11·32

The above table shows that trees treated with the combined insecticide and fungicide had 2·48 per cent less wormy fruit than those treated with Paris green alone. The difference is trifling, but sufficient to settle any doubt or uneasiness, that might be experienced on the question of the efficacy of Paris green as an insecticide when applied with Bordeaux mixture.

Previous experiments show that the amount of wormy fruit might be reduced 8 to 12 per cent by using Paris green with the fungicide.

SPRAYING CALENDAR.

Plant.	1st Application.	2nd Application.	3rd Application.	4th Application.	5th Application.	6th Application.
<i>Apple.</i> Apple spot fungus, codling moth, bud moth.	<i>Copper Sulphate.</i> Before buds start.	<i>Bordeaux.</i> Just before blossoms open.	<i>Bordeaux.</i> <i>Paris Green.</i> —Soon after blossoms fall.	<i>Bordeaux.</i> <i>Paris Green.</i> —10-15 days later.	<i>Bordeaux.</i> 10-15 days later if spot disease is severe.	
<i>Cherry.</i> Rot, leaf diseases and injurious insects.	<i>Bordeaux.</i> Before flower buds open, <i>Kerosene Emulsion</i> for aphids.	<i>Bordeaux.</i> <i>Paris Green.</i> —When fruit has set.	<i>Bordeaux.</i> <i>Paris Green</i> —10-15 days later.	<i>Ammoniacal Copper Carbonate.</i> 10-15 days later.		
<i>Grape.</i> Mildew, rot, leaf eating insects.	<i>Copper Sulphate.</i> Before buds burst.	<i>Bordeaux.</i> <i>Paris Green.</i> —When first leaves are half grown.	<i>Bordeaux.</i> When fruit has set.	<i>Bordeaux.</i> 10-15 days later.	<i>Bordeaux.</i> 10-15 days later. If disease persists.	<i>Ammoniacal Copper Carbonate.</i> If disease persists.
<i>Peach—Apricot.</i> Rot, leaf curl, curculio.	<i>Copper Sulphate.</i> Before buds start.	<i>Bordeaux.</i> 3 lbs. copper sulphate, 3 lbs. lime, 50 gals. water. Just before blossoms open.	<i>Bordeaux.</i> <i>Paris Green.</i> —Soon after fruit has set.	<i>Bordeaux.</i> <i>Paris Green.</i> —8-12 days later.	<i>Bordeaux.</i> <i>Paris Green.</i> —8-12 days later. If rot is prevalent.	<i>Copper Carbonate.</i> 10-15 days later if rot is prevalent.
<i>Pear.</i> Scab, leaf blight, codling moth.	<i>Copper Sulphate.</i> Before buds open.	<i>Bordeaux.</i> Just before blossoms open.	<i>Bordeaux.</i> <i>Paris Green.</i> —Soon after blossoms fall.	<i>Bordeaux.</i> <i>Paris Green.</i> —10-12 days later.	<i>Bordeaux.</i> 10-15 days later.	
<i>Plum.</i> Rot, shot hole fungus, curculio.	<i>Copper Sulphate.</i> Before buds open.	<i>Bordeaux.</i> <i>Paris Green.</i> —Soon after blossoms have fallen.	<i>Bordeaux.</i> <i>Paris Green.</i> —10-12 days later.	<i>Bordeaux.</i> 10-15 days later.	<i>Copper Carbonate.</i> 10-15 days later if rot is prevalent.	<i>Copper Carbonate.</i> 10-20 days later if rot is prevalent.

LARGE FRUITS.

Apples.—The varieties comprising the “standard” apple orchard, so named in contradistinction to the block containing Russian varieties, have on the whole succeeded fairly well, and many kinds have produced samples of fruit. Wealthy, Tetofsky and Duchess have borne heavily for three years, though only planted in 1888.

Scott’s Winter, McMahan White, Gideon and Winter St. Lawrence have borne for two years and give every promise of being useful varieties.

Other kinds not strictly hardy have fruited this year, but cannot be commended for cultivation when grown upon their own stocks.

Among these are Ribston Pippin, Blenheim Pippin, Wagener and Swayzie Pomme Grise; varieties of much value from a commercial standpoint, and highly appreciated as dessert fruits. There is little doubt that the area of their successful and profitable culture might be extended by top-grafting them on suitable stocks, as the trees fail in this locality not so much from direct winter killing as from “sunscalding” of the stem and main branches. By using free growing hardy stocks not affected in this way, the fruit grower in this and similar localities may be assured of a measure of success with these desirable apples.

With a view of securing object lessons of this character, a number of hardy Russian apples have been set in orchard during the past two years, some of which were top-grafted last spring, the remainder are to be top-worked the coming season.

Among suitable Russian varieties for this purpose are:—Hibernal, Cross, and Silken Leaf. When these are not easily procurable Talman Sweet and Haas (Fall Queen, Gros Pommier) may be used with equal or perhaps greater satisfaction, as they attain greater size than most of the Russian sorts. Wealthy has been used in the experimental orchard to a considerable extent as a stock in testing many new varieties, named and unnamed. It is principally defective, in that the scion frequently outgrows the stock, causing rough and unsightly joints at the points of union. This is a serious defect and should be guarded against.

In practising top-grafting on a large scale one of two methods may be followed, viz., top-working the young trees at two years old in the nursery row, and setting them in orchard the following spring, or performing the operation one or two years after setting in orchard. The first plan is the more commendable.

The scions to be used should be cut before severe weather sets in. They will keep in good condition if packed tightly in boxes with dry forest leaves and stored in a cold cellar. The scions should be perfectly dormant and the grafting be done during April and early May, or before the beginning of leaf formation; fair success will follow the operation in this locality up to 1st June. Feeble and immature growth are too likely to follow as a result of such belated work, and it always pays the grafter to keep well ahead of the season. The union should be covered with grafting wax and bound with a cotton bandage.

In the accompanying tabular statement a classification of varieties which have been tested in the standard orchard since 1890, is made on the basis of relative immunity from winter injury during the past four years. Those in column 2 “slightly injured” lost in most cases only a few inches of the terminal growth. In column 3 the injury was more severe, and was often accompanied by sunscald and stem injury. In column 4 will be found the names of those which seem to have been unable to withstand the vicissitudes of this climate and which, therefore, if planted at all in this and similar localities, climatically considered, should only be tried as top-grafts in a limited way.

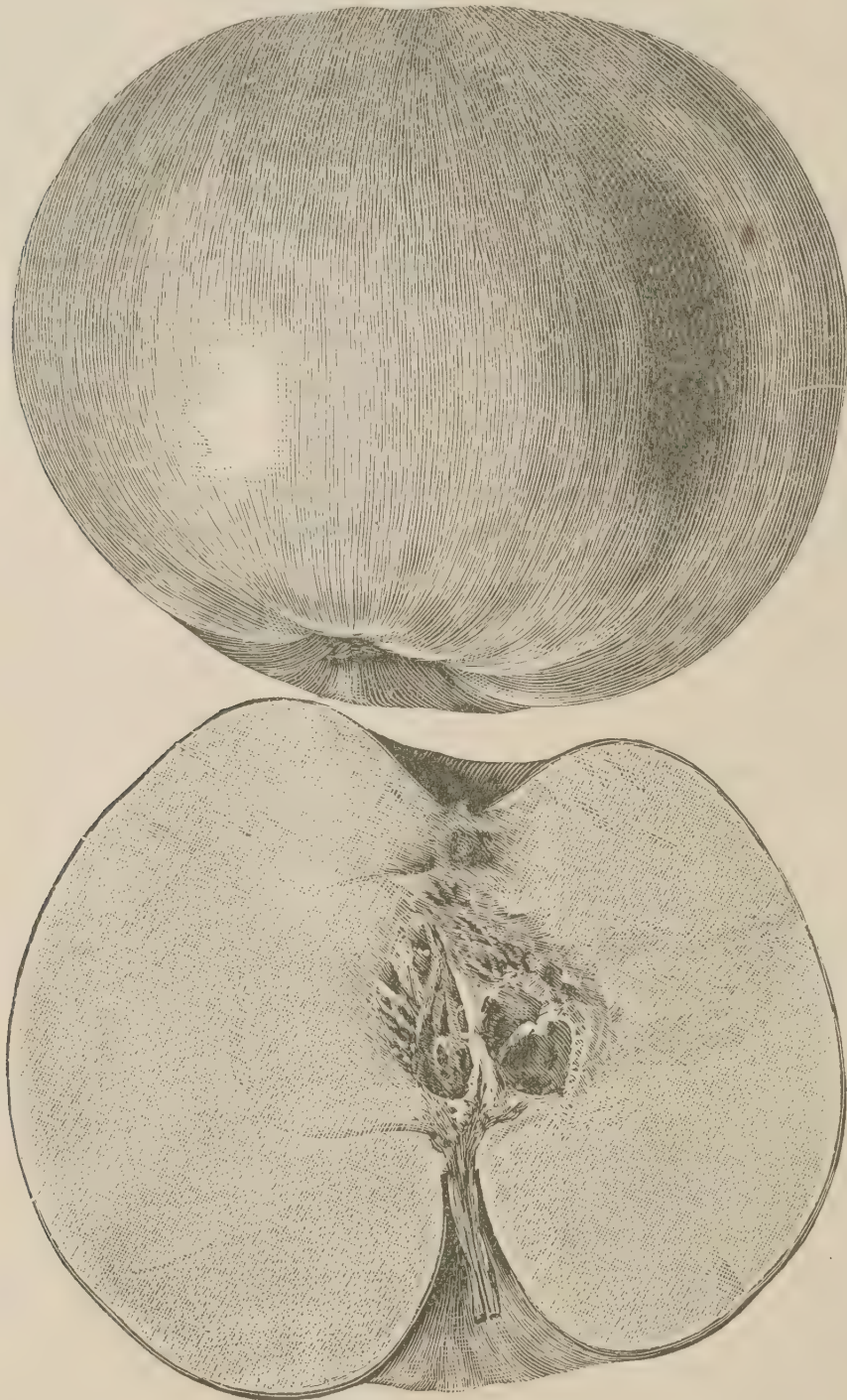
TABLE SHOWING EFFECT OF WINTERS 1890-94 ON STANDARD APPLE ORCHARD.

1 Uninjured.	2 Slightly Injured.	3 Considerably Injured.	4 Killed.
August. Baxter. Ben Davis. Canada Baldwin. Duke of Connaught. Duchess. Davis' Seedling. Edith. Excelsior. Fameuse. Gideon. Giant Swaar. Golden Ball. Haas. Hart's Seedling. John Richardson. Lou. McMahan White. McIntosh Red. Malinda. North Star. October. Orange Winter. Okabina. Peach. Peter. Patten's Duchess, No. 4. Patten's Greening. Princess Louise. Pewaukee. Plumb's Cider. Red Astrachan. Richards Graft. St. Lawrence. Snyder. Shiawassie Beauty. Saxton. Scott's Winter. Salome. Talman Sweet. Wealthy. Wolf River. Winter Duchess. Winter St. Lawrence.	Arkansas Black. Benoni. Beauty of the World. Babbitt. Clayton. Cullen's Keeper. Canada Red. Delaware Red Winter. Fanny. Gano. Golden Russet. Huntsman. Jonathan. Kinnaird. Lawver. Missouri Pippin. Mann's Black Twig. Ontario. Pomme Grise. Primate. Quebec Sweet. Red Beitigheimer. Roxbury, Russet. Rawles Janet. Spencer. Seek-no-further. Sharpe's Russet. Sops of Wine.	American Pippin. Bottle Greening. Bailey's Sweet. Cranberry Pippin. Chenango Strawberry. Crawford. Dr. Walker. Early Harvest. Early Colton. Fall Pippin. Gravenstein. Grimes Golden. Hurlbut. Nodhead. Northern Spy. Rainbow. Rolfe. Spencer. Stark. Swayzie Pomme Grise. Rome Beauty. Sutton's Beauty. Utter's Red. Vandevere. Wagener. Wine Sap. Winter Pippin. Keswick Codlin.	Arkansas Beauty. Belle de Boskoop. Brewington. Cooper's Market. Dominie. Dickson. Family Favourite. King. Lady Henniker. Mason's Orange. Nonpareil. Nero. Perry's Russet. Peck's Pleasant. R. I. Greening. Red Russet. Stuart's Golden. Shannon. Sweet Bough. Spitzenberg. Winter Bough. Warner's King.

APPLES NEW OR MUCH ADVERTISED.

GIDEON.

Originated by Peter M. Gideon, Excelsior, Minn., U.S., and is of the same parentage as Wealthy. The tree is upright in habit and an exceedingly vigorous grower, making strong, clean shoots, and supplied with strikingly large leaves, noted for their thick leathery and somewhat pubescent character. I think it is a better tree than Wealthy and less likely to split at the forks when fruiting heavily. It has never been injured by winter in this locality, but has been affected by blight to some extent.



GIDEON.

The fruit is of the size of Wealthy, but much less highly coloured. It holds to the tree better than Wealthy, but is not equal to it in quality. Where McMahan can be grown it is doubtful whether the planter should include this variety.

Description of fruit.—Above medium size, roundish conic, irregularly ribbed; skin, thick, smooth and greasy. Light yellow, lightly blushed with red and pink mottlings. Cavity, deep and broad; stem, long slender. Basin, small, moderately deep, indistinctly plaited. Calyx, closed. Flesh, white, crisp, juicy, tender, sharp sub-acid. Quality, medium. A number one cooking apple, and not to be despised for dessert. Season, December.

McINTOSH RED.

This fine variety is included with the object of drawing attention to its weak points, as well as its strong points.

The tree is fairly hardy and productive. Quality, first-class. Appearance, handsome. Season, that of the Fameuse or a trifle later, but like the Fameuse it falls an easy prey to the "Spot Fungus" (*Fusicladium*) and no grower should plant it without first making up his mind to deal vigorously with the enemy. The benefits of spraying are now so well recognized, and completely demonstrated, that with such an efficient remedy at hand no one should be deterred from growing this fine variety.

McMAHAN WHITE.

Introduced by A. L. Hatch, Ithaca, Wis., U.S. This variety has already been noted in the report of this division of the Central Experimental Farm, but attention is again drawn to some of its merits as an apple of value for regions where Northern Spy, Ribston Pippin and Rhode Island Greening cannot be grown profitably on account of their inability to withstand the severity of the climate. It has proved so far a remarkably vigorous and healthy grower, making probably more well matured wood growth than any other variety in the orchard, and is free from many of the defects characteristic to varieties unadapted to this climate. It has borne moderately heavy crops for the past two years. The fruit is of the largest size, smooth and handsome, though lacking in colour as grown in this vicinity.

Description.—Fruit, large to very large, round, regular. Skin, green or waxy yellow with a delicate pink blush. Cavity, deep, narrow and lined with dark russetting. Stem, short, swollen at base. Basin of medium depth, slightly wrinkled. Flesh, white, rather coarse, crisp, juicy. Quality, fair. Season, November to January.

SALOME.

Three trees of this variety were planted in 1888; they have not been injured by winter thus far, and have made a uniform, healthy growth. The tree is strictly globular in form, of very compact habit, with a straight, clean stem. This variety has been extensively advertised as a valuable winter sort, of superior hardiness; the latter quality it certainly possesses.

Description.—Fruit; medium or above, roundish conic approaching oblong, prominently ribbed. Skin; green at first, but takes on during winter a suffused pinkish mauve colour. Longitudinal lines between stem and calyx are occasionally present. Cavity; moderate size. Stem; stout, curved, an inch or more in length. Basin; small, irregularly ribbed. Calyx; large, open. Flesh; yellowish white, firm, juicy, pleasant sub-acid. Quality; fair. Season; late winter. This variety when picked was entirely green, but at this date, Dec. 20th, is quite attractive on account of its pleasing colour. It is an apple without striking characteristics in regard to quality, and yet needs proving as to productiveness, but thus far it seems to be an improvement on Walbridge, a reputed winter variety.

SCOTT'S WINTER.

Introduced by Dr. T. H. Hoskins, of Newport, Vermont. It has already been widely planted and the object of mentioning it here, is not so much to recommend it

unqualifiedly, as to draw attention to some points to be borne in mind in connection with its cultivation.

In the first place this is an apple belonging essentially to the same class as Gideon and McMahan, in regard to the locality in which it should be cultivated. Secondly, it should not be grown in sod or without high manuring and clean cultivation, on account of the size of fruit, which is naturally small, and without this treatment becomes unprofitably so. At Grenville, P.Q., Mr. Robert Hamilton reports it "not quite hardy." At other points in Quebec, as well as Ottawa, there has been no complaint along this line. The fruit when well grown is of medium size and handsomely striped and splashed with dark red. It does not reach good eating condition until after mid-winter when its sharp acidity becomes less pronounced. As a keeping apple it certainly excels, being in its best condition from February till May. Its principal value is for culinary purposes.

WINTER DUCHESS.

This variety has fruited for two years past and has proved to be a handsome fall apple of fair quality, but not as good as Wealthy, which comes in at the same season.

WALBRIDGE.

A much advertised winter apple on account of hardiness of tree and keeping quality of fruit. Both claims are quite true, as the tree is an exceedingly vigorous grower, while the fruit without special care keeps through the winter. The fruit, however, is very small and entirely lacks attractiveness, besides being poor in quality. The tree is also a light bearer, and should be planted sparingly. It is said to do best on warm, sandy soils. Where this variety has been extensively planted it would be a wise policy on the part of the owner to top graft the greater portion with more saleable varieties.

RUSSIAN APPLES.

The work of testing these varieties is being carried on from year to year with more or less corroborative results. Some conclusions reached and expressed in my report for 1891 may be repeated as follows:—

1. "That the northern limits of apple culture can be materially extended by planting the hardiest of these varieties."
2. "That all fruit growing districts in Canada may be benefited by adding a judicious selection of the best kinds."
3. "That among them are many valuable summer apples."
4. "That experience seems to indicate that among them are winter apples of fair quality and of superior hardiness." This belief has in a measure been justified by later experience.
5. "That, in the milder portions of Ontario, these winter apples are not sufficiently tested to warrant their being recommended for more than trial in a limited way."

With present experience, I can now say that I do not know of any winter Russian apple which seems to me worthy of cultivation where Ontario and Northern Spy can be grown successfully. The nearest approach to these which I have seen among those which in the same regions could be classed as winter apples, is in the case of "Longfield" and "Arabka." The former can, however, only be classed among winter apples when grown in Northern Quebec.

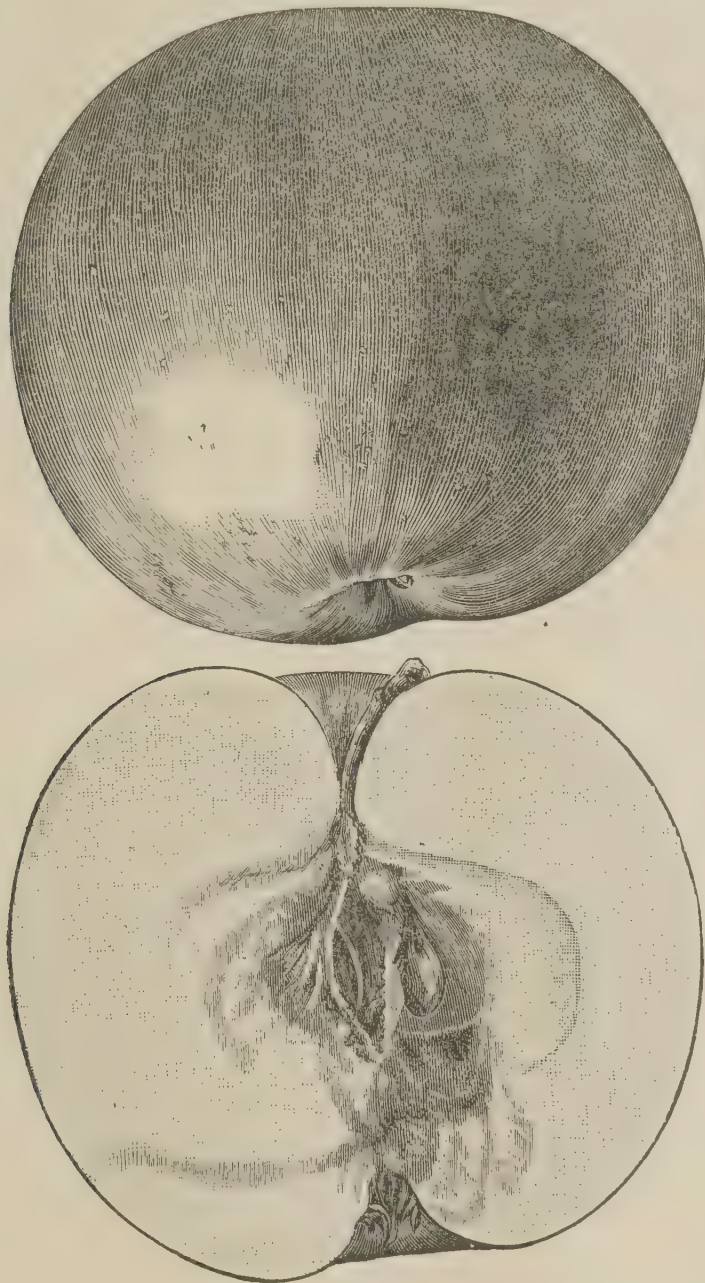
LONGFIELD.

Imported from Russia in 1870 by the United States Department of Agriculture, also by Professor Budd from different sources in Russia in 1883. On account of its

remarkable productiveness, coupled with early bearing habits, it has become widely known. It is said to be a synonym of No. 587, English Pippin.

The tree is difficult to manage in nursery, growing slowly and having a marked predilection for producing a crooked stem and a gnarled top. In orchard, partly on account of bearing very heavily, the tree assumes a more or less pendant form, which makes it easily distinguished from other varieties.

The leaves too are markedly pubescent. This variety is spoken highly of in Vermont, Wisconsin, Iowa, Minnesota, and has lately found favour with prominent Western New York horticulturists, notably S. D. Willard, of Geneva. I am inclined to think the variety grown at Geneva differs slightly in form and appearance from the Western Longfield and that introduced at Abbotsford, Quebec, by the late Charles Gibb. The typical Longfield is almost globular and very regular in form, whereas specimens of the New York variety brought under my notice last year were more or less ribbed, and the form tended towards the oblong.

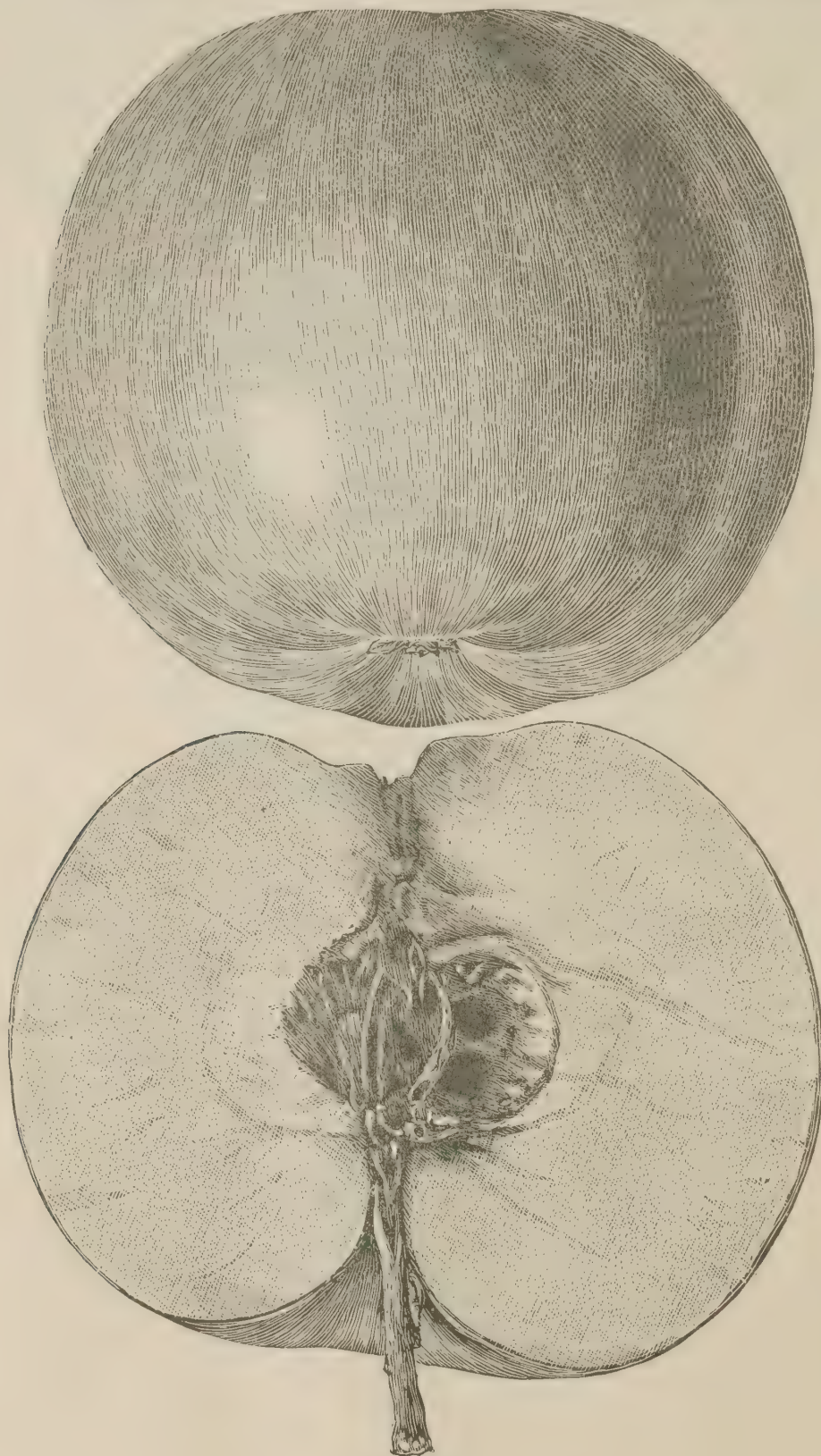


LONGFIELD.

Description.:—Fruit medium to small, round, regular; skin, bright yellow, blushed with bright pink; cavity, almost wanting in some specimens; stem, long, slender; basin small, smooth; calyx closed. Flesh, white, rather soft, melting, juicy, mild, sub-

acid ; quality good, with a suggestion of Fameuse flavour. Season in this locality, October to December ; yet specimens are frequently kept through winter at Abbotsford, Quebec, while Mr. J. C. Chapais, of St. Denis, Quebec, sent me specimens in good condition in June of 1892. Like the Fameuse, it lacks the qualities which constitute a good export fruit.

Fruit should be thinned and the tree well manured, as the tree is likely to overbear.



ARABKA.

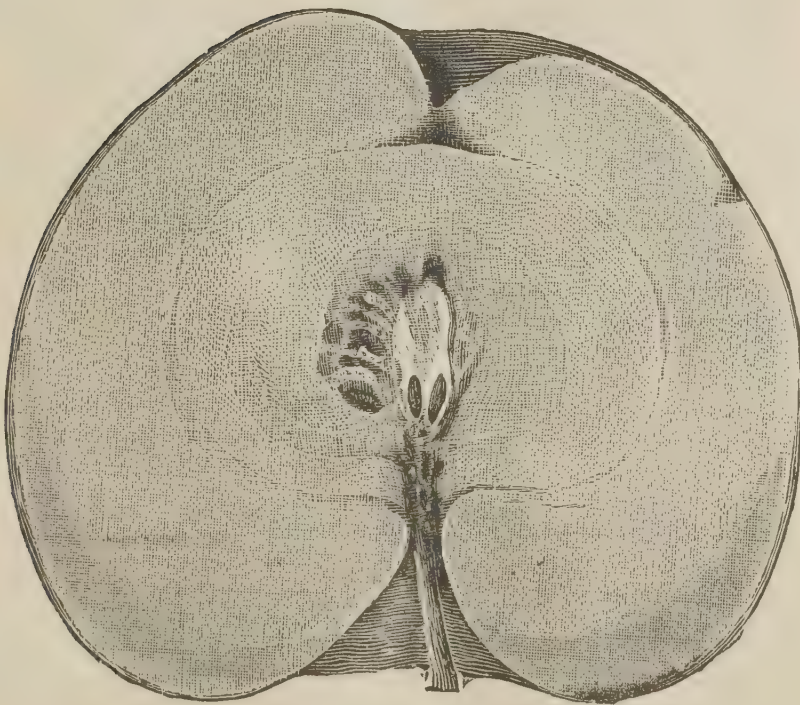
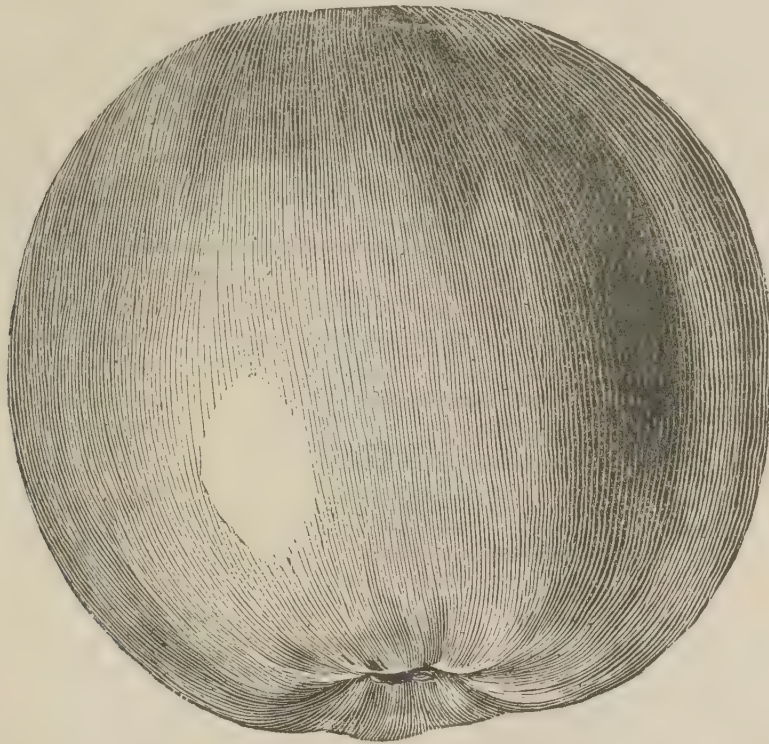
ARABKA (*Syn. Herren. Lord's Apple*).

There has been some confusion existing among fruit growers as to the identity of this variety. The Arabka imported by the United States Department of Agriculture

turned out a summer apple of the Duchess type. Another Arabka imported by Messrs. Ellwanger & Barry, of Rochester, N.Y., answers the description given by the best Russian authorities, and it is this one which is herein described.

Tree, an upright, vigorous grower; leaves, large and thick. It has been perfectly hardy at this point, but has suffered severely from blight for two years past; apart from this defect, which has been more or less common to all the Russian varieties, it appears very promising, as noted in my report for 1891.

Description.—Fruit, large, flattish conic; skin, deep green overlaid by a more or less complete covering of purplish red, and a still darker bloom, interspersed with numerous dots, handsome; cavity of medium size, smooth, narrow; stem, one inch long; basin, shallow, somewhat wrinkled, Calyx, open. Flesh, greenish white, firm, coarse, sharp sub-acid, lacking in aroma and flavour; quality, medium. Core, open. Season, December to March.



CROSS-DEPT.

Among other fall and early winter varieties may be mentioned *Romna*, *Hibernal* and *Cross-Dept.* They all belong to the same family and are large, coarse, handsome apples

of value only in the colder sections of the Dominion either as top-grafting stocks or for culinary purposes. Their usefulness in these lines should not be under-estimated as hardiness and productiveness are characteristics of prime importance in most fruit growing districts of the Dominion.

CHERRIES.

The cherry orchard has progressed very favourably, considering the large number of varieties under trial. As stated in previous reports, none of the sweet cherries have succeeded in this locality and our work has been therefore confined to those of the Morello class, or to forms intermediate between these and the Dukes. The crop of fruit this year was light, except on Ostheim, Minnesota Ostheim, Orel 25 and Vladimir (*of Morris*). These varieties, as in former years, bore a full crop. I have to report in this connection that the trees of the seedling *Koslov Bush Morello*, imported by the Fruit Growers' Association of Ontario in 1890, and placed in charge of the Horticulturist of the Central Experimental Farm, have proved hardy at Ottawa, but exhibit considerable variation in habit of growth and character of leaf and bud. A few blossomed last year, but set no fruit. A larger number blossomed this year and some fruit matured. An examination of the blossoms disclosed the fact that in many instances, they were abnormal in regard to the size and character of the stamens, which may account for the



KOSLOV-MORELLO.

fruit setting so lightly. Samples of fruit secured were of fair size, bright red, heart shaped; flesh soft and rather astringent. Pit, large. Altogether, not promising, so far. But it is not fair to base an opinion on first fruits. I may say that Dr. Charles E. Saunders succeeded in crossing this with other forms of the Morello, and interesting results may be looked for from this union.

Most of the Russian and German cherries described in Bulletin No. 17 of the Experimental Farm have realized expectations then expressed in regard to hardiness and productiveness. The varieties specially recommended are being planted to a considerable extent, but would be more generally cultivated if the trees were easily obtainable. Scions of these are available to a limited extent from the Central Farm.

SAND CHERRY—*Prunus pumila*, L

The encouraging and almost astonishing success which has attended the efforts of those who have directed their energies to the improvement of the native plum, has had the effect of drawing attention to the possibility of a like improvement of the native cherry.

Among the wild edible fruited cherries none present so many desirable characteristics, combined with a natural variability, as are found in the different forms of the Dwarf cherry. The common sand cherry *Prunus pumila*, L., is widely distributed throughout Canada. Macoun says it is found in New Brunswick, Quebec, and westward along the St. Lawrence and great lakes and on the prairies to about the 106th meridian. Its natural habitat is on sandy or rocky shores, flourishing even among drifting sand. An allied form *Prunus Besseyi*, Bailey, is found growing freely upon the sandy plains west of the Missouri River creeping up to, and upon the foothills of the Eastern Rockies.

Plants of the Sand cherry are easily grown from seed. "When young—one year old—it is strictly erect, but as it becomes older the base or trunk becomes reclined and often covered with sand; but the young growth maintains its erect character. The plant has long and narrow sharply-toothed leaves and a willow-like habit." (Bailey in Bulletin No. 70, Cornell University Exp. Sta.) This willow-like appearance is quite marked, so much so that some of those who received plants of this cherry, which were distributed last spring through the provincial horticultural societies, were led to inquire if a willow had not been sent in mistake for the Sand cherry. At four or five years, this plant forms a trailing bush three or four feet high, with a horizontal stretch of branches, twice that distance. The trailing branches frequently take root and thus it is easily propagated by layering. On account of its dwarf habit and great hardiness, it would seem valuable for cold districts, especially where it would be naturally protected by snow. The fact of it growing so freely on any sandy location would seem to indicate that it possesses the requisite qualifications for successful cultivation in dry climates.

FRUIT.

The fruit exhibits in the wild state and under cultivation, great variability as to size, quality, and season of maturity. In the spring of 1888 six plants were set in nursery row at the Central Farm, which were obtained from the drifting sands on the eastern shores of Lake Huron. They made fair growth and began fruiting in 1891. The fruit was not promising either in regard to size or quality. Attempts were made—but without success—by the writer in 1891-92 to effect a cross between the sand cherry and varieties of the Morello. A considerable quantity of seed was collected in 1892 and sown the following year. Several thousand plants were raised, a portion of which were distributed to members of the provincial horticultural organizations of the Dominion. As in all probability these plants will vary widely, I shall be obliged if those who have received them will report to this division in regard to the character of fruit obtained. A considerable proportion of the plants grown from seed in 1893 and allowed to remain undisturbed in the nursery row, fruited this year. The accompanying illustration is reproduced from a photograph of a selected sample of fruit, natural size, from one of these plants.

As a rule the fruit is smaller than Early Richmond, black, round and sometimes slightly conical or heart-shaped. The flesh is rather tough, the juice inclined to be bitter and the pit large. The variation illustrated (and there were many others all more

or less striking) is larger than Early Richmond, flesh firm, not tough, juice sub-acid, pit of medium size. It ripened soon after the middle of August, but did not fall from the bush till the middle of September.



PRUNUS PUMILA—SELECTED SAND CHERRY.

Prof. Green of the Experiment Station of Minnesota, speaking of the fruit of *Prunus pumila*, says : " Quality varies greatly, some being a mild, not disagreeable sub-acid, others insipid, and still others very astringent. * * * When cooked it makes a nice sauce."

SAND CHERRY AS A STOCK.

It has been recommended by Prof. Green and by Prof. Budd of Iowa, as a desirable stock for hardy forms of the Morello cherry. I am unable from personal experience to endorse this assertion, as experiments tried here last year and the year previous, in budding Morello cherries upon this stock resulted in every case in almost complete failures. Cherry root grafts were scarcely more successful. Native and European plums, both budded and grafted "took" much better, and so far have made a satisfactory growth. The permanency of the union yet remains to be proven. Prof. Green quotes Hon. C. W. Heiderman, New Ulm, Minn., as stating that he "had been very successful in grafting the sand cherry on the native plum," and remarks that if this proves satisfactory "we will have in this sand cherry, so worked, a very pretty orna-

mental tree, as beautiful in flower, and in habit as some of the Japan forms of weeping cherries, and withal hardy."

PROPAGATION.

As already stated, it grows easily from seed, and may readily be multiplied by layering. It also throws up suckers, and in common with plants of this habit may be propagated from root cuttings.

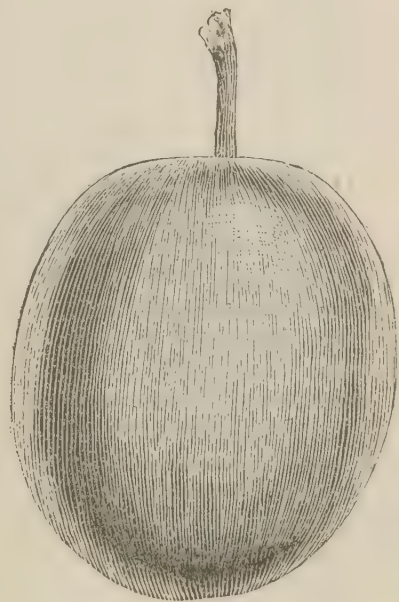
PLUMS.

Upwards of 60 varieties of *Prunus domestica*, mostly blue and yellow plums, grown as standards, have been tested in the plum orchard at Ottawa since 1888. This does not include about 20 varieties belonging to the same type but of Russian or Eastern European origin. The greater proportion of the first named class have failed entirely, a small share of them live from year to year being annually cut back by the winters, and a still smaller number have produced a few samples of fruit. Those which have succeeded best are Glass Seedling, Shropshire Damson, Blue Damson, Copper, and Canada Egg. The better known commercial varieties like Lombard, Duanes Purple, Munro, and Bradshaw, have failed entirely. Glass Seedling, Shropshire Damson, and Canada Egg, may be grown with fair success in sheltered, city gardens, but are unreliable in orchard culture.

A number of Russian plums have been under trial, and are promising as far as hardiness is concerned, but up to date have not given evidence of productiveness, nor have they borne fruit of high quality. Two varieties, however, deserve special mention on account of desirable characteristics of fruit as well as of tree.

EARLY RED.

Imported from Russia by Professor Budd from Dr. Regel, of St. Petersburg, Russia, during the winter of 1881-2. Professor Budd writing in 1890 says: "this was sent out quite extensively eight years ago marked 'Mixed Arab.'" The sorts mixed were Early Red, White Nicholas and Black Arab—now called Black Plum. It has since been proved that nearly all the trees sent out were Early Red, which is our No. 3 from St. Petersburg. The tree has proven hardy as far North, as our native plums can be grown, and an early bearer of purplish red fruit as large as the Lombard, better in quality and two weeks earlier."



EARLY RED.

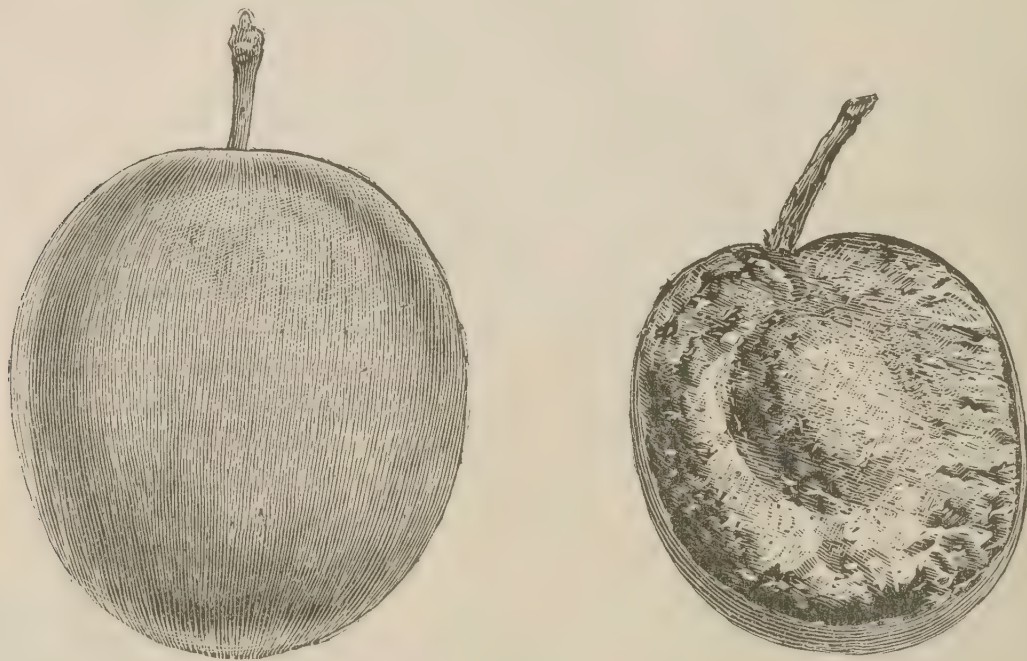
At Ottawa the tree preserves a compact almost globular form, making a slow growth annually, of well ripened wood which thus far has not been injured, even by 30 degrees below zero, Fahr. Shoots are slender, of a purplish colour; leaves, small ovate.

Fruit.—One and five-eighths long, by one and a half inches, laterally; perfectly oval, dark red with white dots showing through a light lilac coloured bloom. Suture, not clearly defined. Stem, one-half to three quarters of an inch long. Flesh, firm, meaty yet juicy; fair quality. I do not consider it surpasses Lombard in this respect. Stone is of medium size and closely adhering to flesh. Ripens during the second week in September in this latitude. If this variety proves productive it will be a decided acquisition.

MOLDAVKA.

Imported with the last by Professor Budd from J. E. Fischer, of Voronesh, Russia. Of this Professor Budd says: "a South Russian variety that stands if grown with a low stem, up to the 43rd parallel. It comes into bearing early and the fruit is nearly as large, handsome and as good as the Bradshaw." Like "Early Red," the tree is a round topped, sturdy grower. The young shoots are stout and thick, of a reddish purple colour. The leaves large and leathery. I do not think it is as hardy as the last, but four trees of it have stood our test winters so far without injury.

Fruit.—Large, frequently two inches in length and one and three-quarter inches laterally. Ovate, slightly onesided. Colour, dull brownish purple overlaid with a heavy, blue bloom. Suture, well marked and terminating in a swollen knot on one side. Stem, short, stout, set in a deep, round cavity. Flesh, greenish yellow, moderately firm, juicy, mildly sub-acid, not highly flavoured; medium quality. Stone, medium size, oval, firmly attached. Ripens soon after September 1st. My field notes say "rather promising, but so far a light bearer."



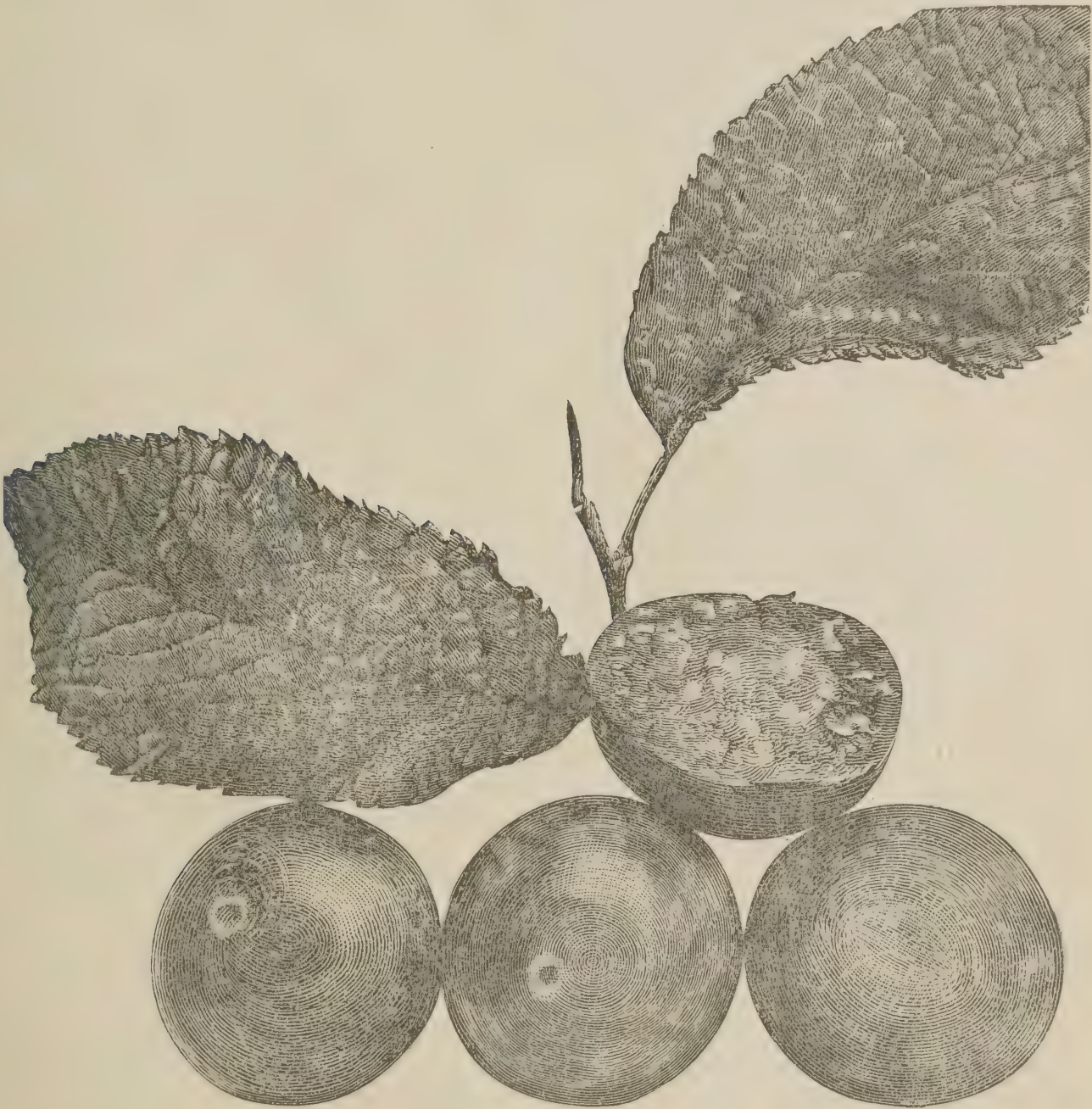
MOLDAVKA.

NATIVE PLUMS.

All who have seen the best varieties of the native plum are becoming more impressed every year with their value. New and desirable varieties are constantly appearing, all pointing to the possibility of still greater improvement. In my report for 1892 attention is drawn to some of those which had fruited at the Central Farm, and illustrations were given of the most valuable. Impressions and opinions formed and expressed in that article have been confirmed by the experience of the last two years, and I feel justified in urging upon nurserymen and fruit growers in Eastern Ontario and the province of Quebec the desirability of propagating the varieties then recommended. Whether considered from a commercial or home-use standpoint, there is money as well as satisfaction for the grower who cultivates them.

The following varieties have been added since 1892 :—

Name.	Character of Tree.	Origin.	Type.
Bicksley.	Hardy	Iowa	P. Americana.
Black Hawk.	do	do	do
Comfort.	do	do	do
Chas. Downing	Tender	do	P. Chicasa.
Col. Wilder.	do	do	P. Americana.
Garfield	do	do	P. Chicasa.
Hunt.	Hardy	do	P. Americana.
Jas. Vick.	Tender	do	P. Chicasa.
Jessie	?	Kansas.	do
Milton	Tender	Iowa	do
Pottawattamie.	do	do	do
Rockford.	Hardy	do	P. Americana.
Sophie	?	Maryland	P. Chicasa.
Stoddard	Hardy	Iowa	P. Americana.



HAWKEYE.

Attention is drawn to the following varieties :—
HAWKEYE.—Introduced by H. A. Terry, Crescent City, in the Hawkeye State (Iowa). Tree a free grower, more easily trained in symmetrical form than most of this

class. Young shoots dark red with large pointed buds. Leaves, large, prominently veined. With a judicious amount of heading in when young the tree readily assumes a compact, round-headed form. Hawkeye so far has shown remarkable productiveness, this, coupled with the large size, fine appearance and fair quality of the fruit, will undoubtedly make it a popular variety.

Description.—Fruit, large, almost round; skin, thick, dark red, with lilac coloured bloom; suture indistinctly marked. Flesh, deep yellow, firm (for a native), juicy. Stone large, flat, separates readily from the flesh. Quality good. Ripens September 10th to 20th. When canned there is a perceptible but not unpleasant suggestion of astringency about the skin. This variety possesses the qualities of a keeper and shipper.

STODDARD.

Introduced by C. G. Patten, Charles City, Iowa, The tree resembles Hawkeye in general characteristics. Fruit medium to large, round or slightly one sided; average specimens, measure one and a half by one and a half inches. Skin thick, not astringent, shading from yellowish red to dark red. Bloom of light lilac colour. Suture distinctly marked. Flesh deep yellow with red shading, juicy, sweet. Quality good. Pit large, flat, clinging. Season rather earlier than Hawkeye, but this may change somewhat with increased production and advancing age of tree.

NEW PLUMS RECEIVED FOR EXAMINATION.

A large number of interesting samples of new plums either thought by the originators to be worthy of introduction, or forwarded for examination, have been received this year. I have selected a few which appeared worthy of special mention.

SNELLING (*P. hortulana*, Bailey).

Tree produced 13 or 14 years ago by Mr. W. H. Snelling, of New Edinburgh, Ontario, from a farmer at Gatineau Point, Quebec, as a sprout near an old tree. It evidently belongs to the Miner family of plums, which Prof. Bailey has placed as a division of *Prunus hortulana*. Mr. Snelling reports that the tree, which is now fourteen years of age, has fruited heavily for several years, and has never been affected by rot or the spot disease (*Cladosporium carpophilum*. V. Thümen.)

Description.—Size, $1\frac{3}{4}$ inches from the stem to calyx, $1\frac{1}{8}$ inches laterally. This is the measurement of a large specimen. Form, usually round; stem, one inch long, set in a round cavity. Calyx basin, almost wanting. Suture, well defined, though not deeply marked. Colour, a yellowish red ground, covered in part with darker red approaching crimson; very little bloom. Skin thin, tender, and apt to crack when fully ripe. Slightly astringent. Flesh soft, very juicy, sweet; quality good. Stone large, flat, almost round, without wings. Ripens from the 15th to the 20th of August. Mr. Snelling has sent to this office specimens of the fruit and wood for the past two years, and I am assured that it is a variety worth careful trial. The tenderness of the skin and softness of flesh are its weakest points.

LILLIAN AUGUSTA (*Prunus domestica*.)

From Richard Trotter, Owen Sound, Ontario. Received on August 24th, 1894. Mr. Trotter says: "I send you four plums for your inspection. They are not the largest, but are of average size. The tree is hardy and a good bearer. I was obliged to pull them before they were fully ripe, in order to save them. I have named the variety 'Lillian Augusta.'"

Description.—Two and a quarter inches by two inches laterally. Form, symmetrical, egg-shape; colour, greenish yellow; stem, three quarters of an inch long; suture, indistinctly defined; cavity, small; basin, wanting; flesh, firm, meaty, fairly juicy,

slightly acid : quality good ; stone, medium to small, partly free. On the whole a promising variety.

JOHN A.

From Richard Trotter, Owen Sound, Ontario, received September 10th ; Mr. Trotter says this variety is the result of a cross between a local seedling called " Evelyn " and " Fellenberg," the latter being the male parent. It is a rapid, strong grower with heavy foliage, which it retains late in the season. The fruit keeps well.

Description of fruit.—Large, oblong or egg-shaped, slightly flattened laterally ; tapering towards stem ; colour, dark bronzy red with brighter blush near calyx ; bloom, heavy purplish blue ; suture, quite deeply marked ; cavity, one sided with swollen lip on side opposite suture ; stem, one and a quarter inches in length, stout ; flesh, greenish yellow, firm and juicy, a pleasant sub-acid ; pit, large and semi-clinging ; the prune characteristics are strongly marked ; as a keeper it may be valuable.

A. M. Smith, of St. Catharines, Ontario, sends, under date of October 5th, a sample of blue plums which I have described as follows :—

Size, one and three eighth inches, by one and a quarter inches ; nearly round ; colour, blue with a thick blue bloom ; suture, indistinctly marked ; stem, three quarters of an inch long ; cavity, narrow and small ; skin, thin ; flesh, firm, dark coloured, juicy, moderately sweet ; fair quality ; stone, small, round, adherent to flesh. This is probably a Damson seedling, and may be valuable on account of its lateness.

SOME DESIRABLE CRAB APPLES.

The Siberian crab, *Pyrus prunifolia*, has played a most important part in the amelioration and improvement of pomaceous fruits adapted to cold latitudes. Contemporaneously with the early settlers of Canada came the red and yellow Siberian crabs, and in nearly every old seedling orchard may be found venerable trees bearing this useful kitchen fruit, contributing their quota year after year to the housewife's store of jellies and preserves. In the tree we have a rare combination of vigour and productiveness, but also a tendency to blight. The most important development among apples from this race is the Wealthy, which was given to the public by Peter M. Gideon, of Excelsior, Minnesota, after years of patient labour. October, Peter, and Gideon are other varieties originated from the same stock and therefore supposed to be true hybrids between the cultivated American apple and the Siberian crab.

The late Chas. Gibb, writing in 1884 said : " The Russian apple will undoubtedly enable us to extend our area of apple culture northward. Let us remember, however, that the hardiest known form of the apple is the Cherry crab of Siberia."

In weighing their merits and demerits he says, " their good points are 1st, hardiness and productiveness ; 2nd, early bearing ; thinness of skin of the fruit ; 4th, brisk, sprightly flavour. The weak points are, 1st, smallness of size of fruit ; 2nd, an astringent or ' puckery ' flavour, and I would add, a tendency to blight."

It is well to remember, as Mr. Gibb adds, " that the smallest crab can produce as good a codling worm as the largest apple, and that inferior crabs, whose fruit is not worth picking, may produce large numbers of codling moths, and may thus be a source of great loss to the owner of the orchard."

The following is a descriptive list of those which have fruited during the past three years. They are all true Siberians or their descendants, with the exception of Soulard (*Pyrus coronaria*.)

TABULATED information concerning varieties of Crabs.

Name.	Origin.	Size.	Colour.	Quality, Flavour.	Use.	Season.
Ball's Winter.....		Large	Green, blushed..	Astringent medium..	Jelly	Dec. to Jan.
Bowman.....		Medium..	Pink.....	Good.....	Canning.....	Sept.
Brier's Sweet.....	B a r a b o o ,					
	Wis.....	Large	Yellowish pink..	Sweet, good.....	Baking.....	do
Chicago.....	Marengo, Ill.	Small	Yellow.....	Sub-acid, medium...	do ..	Nov.
Coral.....	Marengo "	do	do	do ..	do	Dec. to Feb.
Chase's Blush		Large	Bright red.....	Acid, good.....	Canning.....	Sept.
Dartmouth.....		Small	Dark red.....	Acid, astringent ..	Jelly	do
Early Strawberry..	Minnesota..	Large	Striped red.....	Sub-acid, good.....	Table, canning	Early, Aug.
Gen. Grant.....	do ..	do	do	Astringent, poor...	Cooking	Early, Aug.
Gibb.....	Wisconsin..	do	Yellow.....	Sub-acid, good.....	Table, canning	Sept.
Hesper Rose.....	Minnesota..	do	Crimson.....	Mild, sub-acid; poor.	Canning	Aug.
Hyslop.....		Medium..	do	Astringent, medium.	Jelly	do
Jumbo.....	Quebec.....	Large	Yellow-pink ...	Sub-acid, fair.....	Baking.	Sept.
Martha.....	Minnesota..	Medium..	Pink.....	Acid, fair.....	Jelly, canning.	do
Montreal Beauty..	Quebec.....	do	Crimson.....	Astringent, fair....	Jelly	do
Minnesota.....	Minnesota..	Very large	Yellow.....	Sub-acid, fair.....	Cooking	do
Meeder's Winter..	do ..	Small	Dark red	Sub-acid, good.....	Baking.....	Dec.
Orange.....	do ..	Medium..	Orange yellow ..	Sub-acid, best.....	Table, canning	Oct.
Orion.....		Large	Yellow.....	Mild, sub-acid ; fair.	Baking.....	do
Paul's Imperial...		Medium..	Crimson.....	Fair.....	Jelly	Sept.
Quaker Beauty...	Minnesota..	Small	Yellow russet...	Acid	do	Nov.
Queen's Choice (syn. "Montreal Waxen").....		Medium..	Red.....	Astringent.....	do	Oct.
Rose of Stanstead.	Quebec.....	do ..	do	Sub-acid, good.....	Canning.....	Aug.
Soulard	Misouri...	do ..	Green.....	Astringent, poor...	Jelly	Oct.
Transcendent.....		do ..	Crimson.....	do	Jelly, canning.	Sept.
Van Wyck.....	New York..	Small	Yellow.....	Astringent.....	Jelly	do
Whitney.....	Illinois.....	Large	Striped red.....	Sub-acid, good	Table, canning	Aug.

It is difficult to select the best from such an extended list, when the variation is often very slight and frequently inappreciable. The following are desirable kinds, and are described in their order of ripening :

EARLY STRAWBERRY—This originated in Minnesota some years ago, and I have known it for at least ten years. The tree is a strong grower, making a large spreading top. It does not come into bearing as early as other varieties, but is, on the other hand, reliable and productive. The fruit is medium to large, round, striped and mostly covered with red. Flesh is of fine texture, brisk sub-acid and free from astringency. It ripens with the Red Astrachan apple, which it fully equals, if not surpasses, in quality. This is also an excellent variety for canning. Of recent years the fruit has "spotted" to a greater or less extent.

WHITNEY (syn. *Whitney's No. 20*).—This originated with A. R. Whitney, Franklin Grove, Ill., and has been propagated and disseminated with great rapidity on account of the hardiness and symmetry of the tree, as well as its productiveness. These characteristics make it a favourite with nurserymen. The fruit is of the largest size for a crab, and might easily pass for a small apple. In form it approaches oblong, is deeply splashed and striped with red. The flesh is mellow, juicy, sub-acid. Quality, good. After maturing, the fruit decays very rapidly, rotting first at the core. Ripening about the middle of August, it disappears in a few days, and considerable judgment is required in order to harvest it without loss.

HYSLOP—One of the best known and most generally cultivated of all the Siberian crabs. It is not as prolific as Transcendent, but keeps longer and is a handsomer fruit

While very astringent, the thinness of the skin of this variety makes it a favourite for canning and for jelly-making.

The tree is reported as succeeding on even heavy clays. It is in good condition from September 15th to October 15th.

MARTHA.—This is a remarkably handsome tree in orchard, the form being symmetrical and upright, clothed with large healthy leaves, strikingly pubescent. Bears young and heavily. Fruit, medium to large, oblate; skin, smooth and shiny, nearly covered with a pinkish blush. Cavity deep; basin smooth, regular. Flesh yellow, crisp, juicy and acid. Excellent for canning and jelly-making. About the same season as the last.

GIBB.—Raised by the late G. P. Pepper, of Pewaukee, Wis., from seed of Yellow Siberian, fertilized with Fall Greening. It was named by Mr. Pepper in honour of Chas. Gibb, who first observed it bearing in his orchard. The following is Mr. Gibb's description of this valuable crab: "The fruit is large in size, averaging two inches across by an inch in depth. I have grown specimens which were three inches in diameter. The skin is yellow, with a blush of dull red on one side; flesh remarkably yellow, crisp and juicy, with a rich mingling of acidity and sweetness. Its astringency is so slight that it is hardly perceptible unless specially looked for. The flesh is quite firm, but breaking, although not melting, until it becomes yellow and ceases to be crisp. Its thinness of skin and sprightliness of flavour are Siberian characteristics which make it a favourite."

The tree is a slow grower, hardy and bears young and heavily. Mr. Gibb stated further that it was his "favourite crab for canning." Season, September 15th to 30th.

ORANGE.—Originated in Minnesota. Tree hardy. Upright in habit of growth. It bears young and is very productive, so much so that the fruit becomes small with advancing years. Average specimens are of medium size, rough, with a rough, russetty yellow skin. The flesh is sub-acid and quite pleasant when eaten raw. When over-ripe it lacks juice and is apt to be pithy. Season, Sept. 15th to Oct. 15th. Excellent for canning.

Among the most desirable of the winter crabs for which there is small demand, I will mention: *Coral*, *Meeder's Winter* and *Quaker Beauty*.

SMALL FRUITS.

GRAPES.

The past season was one of the most favourable for the thorough ripening of this fruit which has occurred in this vicinity within a decade. Fungous diseases were not prevalent to a serious extent, and those appearing were easily controlled with Bordeaux mixture. At the Central Canada Exhibition held during the last week of September, 142 varieties were shown, of which number fully 75 were well ripened. Ripening continued up to Oct. 15th.

"Farrell," a white grape mentioned in the report of the Horticulturist, last year, produced in abundance enormous bunches of fruit upon vines planted three years ago. The berries, which, were described as small last year, were much larger this season, and while the fruit did not reach perfect maturity, yet it gave assurance of good quality. It should be tested in our best grape growing districts. It is the largest white grape which has fruited here.

BRILLIANT.—Of T. V. Munson, a cross between Delaware and Lindley, is a promising red variety for home use. It does not seem sufficiently vigorous or productive for market. But the vines are still young. Good quality.

PEABODY—A seedling of Clinton raised by J. H. Ricketts of N. Y., is by no means a new variety, but it is mentioned here with a view of dilating on its good points.

1. It bears heavily and has been but slightly affected by mildew and to a small extent by Anthracnose.

2. The fruit ripens every year at Ottawa, and the berry holds well to the bunch.
3. Bunch large, well shouldered; berries, medium size, black, oval; quality, first class, combining a sprightly acid with a rich vinous flavour. After eating fruit of Niagara or of the Rogers varieties, a bunch of the Peabody is positively refreshing. Of greatest value in the garden of the amateur.

SECRETARY—Produced by J. H. Ricketts, Newburg, N. Y., bycrossing Clinton with Muscat Hamburg. This variety yielded remarkably fine bunches the past season.

Bunches and berries medium size, the latter oval. Skin moderately thick, pulp very meaty and of an exceedingly pleasant vinous acid. Seeds small, 2 to 3 in each berry. On account of its meaty character of flesh, it keeps well. This variety combines in a remarkable manner in both vine and fruit the good qualities of European and American grapes. It is not likely to become commercial as it does not succeed in all soils, and is not a vigorous grower. *Mills* might be classed with it, as having the same meaty character of flesh.

RASPBERRIES.

All varieties not protected, suffered badly last winter, and the principle of, and advantages accruing from, winter protection are now pretty generally accepted.

The production and trial of seedlings is being continued and the work is extending each year. The variation of the new varieties from year to year consequent upon environment in the matter of soil or climatic conditions, consequently impresses the lesson of caution upon the introducer of new varieties. Many seedlings now discarded, gave three years ago strong indications of value and usefulness, but time and changed conditions have developed defects not then apparent. A number of the best seedlings have been named and sent to the branch farms for trial, and the quantity of each increased for a more comprehensive test at the Central Farm.

As a market berry nothing better among red varieties, than Cuthbert has yet appeared. *Gladstone*, *Superlative* and *Beaconsfield* of the *Rubus Idæus* or European class have fruited, but do not appear valuable and will no doubt remain in the amateur list, on account of lack of productiveness as well as tenderness of cane and softness of berry. *Sarah* raspberry did not fruit heavily on account of having mutilated the roots in securing cuttings for propagation.

Of *Black Caps*, *Older*, described and illustrated last year, easily retained first place, both for productiveness and quality. The plant is also more easily kept in form than other members of this division.

STRAWBERRIES.

The season was favourable to the development of this fruit, although unfavourable, owing to more or less continuous rainfall, to marketing it in good condition. The strawberry plot contained most of the new varieties, including a considerable number of Farm grown seedlings. It was planted in the spring of 1893. The rows are three and a half feet apart with the plants grown in matted form, which is after all the only practicable commercial system.

The ground was cultivated and the runners cut off until mid-summer, when the interspaces were mulched with manure. Any weeds appearing after this were pulled by hand or cut out with a hoe. After the ground was frozen in the autumn, the whole bed was covered with a coating of oat straw, the lightest covering being given to the rows. The plants came through in fine condition. The straw was removed before growth commenced and the ground cultivated till the fruit began to ripen when the straw was returned to the rows. Each variety was made up of two parallel rows 30 feet in length.

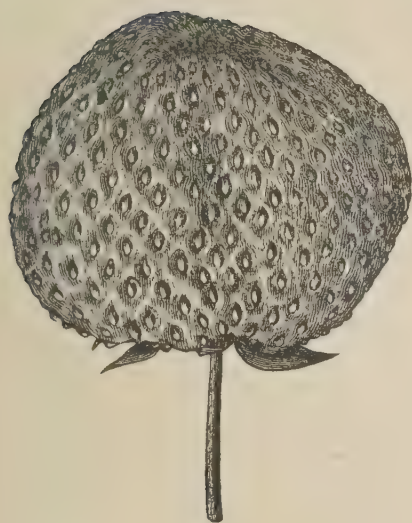
The tabular statement on p. 142 gives information regarding the yield and character of the foliage, in regard to its freedom from rust. In order to test the effect of burning the leaves after harvesting the fruit, as is often recommended, the foliage on one row of each variety was mowed off and burnt without removing it from the plants. Where there was an extra amount of litter about the plants the crowns were injured, which had the effect of thinning the plants in the rows quite materially. The resulting growth was at first luxuriant and healthy, but rust soon appeared, and made rapid headway, developing so quickly that there was little discernable difference from a casual



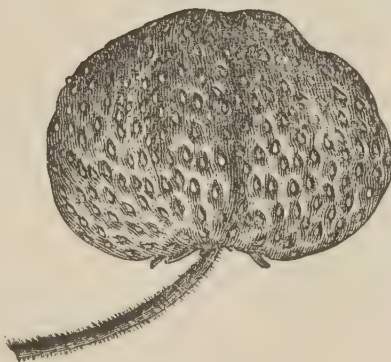
WILLIAMS.



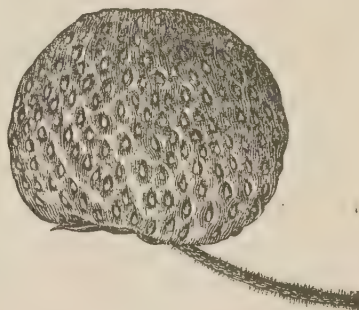
WOOLVERTON.



77 X (A SEEDLING).



BEDER WOOD.



DESIRABLE STRAWBERRIES.

examination in the autumn between the two series. But the tabular statement shows that in health there was a marked difference in favour of the burnt rows. What will be the result of the experiment next year on the health and fruitfulness of the plants so treated remains to be seen.

It also remains an open question which will be tested next year, whether the same or better results might not be secured by treating the vines with Bordeaux mixture. Burning the vines, however, is an inexpensive operation, and one treatment serves the purpose. Notes were taken on a scale of 1—10 the highest number being expressive of entire freedom from rust.

TABLE showing facts concerning Yield and Health of Foliage.

Strawberries.	Sex.	Date of First Picking.	Date of Last Picking.	Yield in Boxes, from a row 60 feet long.	Leaf Rust on Foliage Burnt, Scale, 1-10.	Leaf Rust on Foliage not Burnt, Scale, 1-10.
<i>Variety.</i>						
Auburn	P	June 25 ...	July 11....	17	8	6
Belmont	B	" 25....	" 11....	16 $\frac{1}{4}$	8	5
Black Giant	B	" 25....	" 3....	8	6	4
Boynton	P	" 22....	" 11....	30 $\frac{1}{4}$	9	7
Beder Wood	B	" 23....	" 11....	29 $\frac{1}{2}$	6	4
Beverly	B	" 25....	" 11....	39 $\frac{1}{2}$	8	4
Bartons	P	" 25....	" 11....	35 $\frac{1}{2}$	6	4
Bubach	B	" 22....	" 11....	23 $\frac{1}{2}$	7	5
Cohansick.....	B	" 28 ...	" 11....	11 $\frac{3}{4}$	4	3
Crescent.....	P	" 12....	" 11....	40	9	5
Cameronian	B	" 25....	" 11....	16	6	4
Captain Jack.....	B	" 25....	" 11....	17	7	6
*Crawford.....	B	" 25 ...	" 5....	7	6	5
Daisy	P	" 25....	" 11....	16 $\frac{1}{2}$	8	5
Dayton	B	" 23 ...	" 5....	16 $\frac{1}{2}$	9	7
Daniel Boone.....	P	" 25....	" 5....	15 $\frac{1}{2}$	4	4
Eureka	P	" 25....	June 30....	2 $\frac{1}{4}$	9	7
Early Canada.....	B	" 22....	July 5....	11 $\frac{3}{4}$	8	7
Gandy	B	" 28....	" 11....	9 $\frac{3}{4}$	8	6
Green Prolific.....	P	" 25....	" 11....	15	7	5
Garibaldi	P	" 28....	" 11....	7 $\frac{3}{4}$	8	5
Governor Hoard.....	B	" 25 ...	" 11....	8 $\frac{1}{2}$	8	3
*Gillespie.....	B	" 25 ...	" 5....	1 $\frac{1}{2}$	8	6
Hoffman's Seedling.....	B	" 25....	" 11....	11 $\frac{3}{4}$	6	5
Haverland	B	" 22....	" 11....	27	6	5
Itasca.....	B	" 30 ...	" 11....	24 $\frac{1}{4}$	5	5
Iowa Beauty.....	B	" 25....	" 11....	11 $\frac{1}{2}$	7	4
John Little.....	B	" 25....	" 11....	35	8	6
James Vick.....	B	" 25....	" 11....	38 $\frac{3}{4}$	4	3
King of the North.....	B	" 25....	" 11....	9 $\frac{1}{4}$	8	4
*Logan	B	" 25....	" 11....	14	8	5
*Leader.....	B	" 25....	" 3....	1	8	6
Moore's Prolific.....	B	" 25....	" 11....	2 $\frac{1}{4}$	8	6
Mammoth.....	B	" 25....	" 11....	6 $\frac{1}{4}$	7	6
Miller's Seedling O. 2.....	B	" 22....	" 5....	16 $\frac{1}{2}$	7	4
Miller's Seedling, H. 11.	P	" 25....	" 11....	14 $\frac{3}{4}$	10	7
Mrs. Cleveland.....	P	" 23....	" 11....	17 $\frac{3}{4}$	9	7
Middlefield	P	" 28....	" 11....	9 $\frac{3}{4}$	8	6
Martha.....	P	" 25....	" 11....	34 $\frac{1}{2}$	6	4
Nicanor	B	" 22....	" 5....	9	7	6
Norman	B	" 25....	" 5....	9 $\frac{1}{2}$	6	5
New Dominion.....	B	" 25....	" 11....	30 $\frac{1}{2}$	6	4
Osceola.....	B	" 22....	June 30....	13 $\frac{1}{2}$	9	8
Pearl.....	B	" 22....	July 11....	26 $\frac{1}{4}$	7	5
Pine Apple	B	" 23....	" 11....	19 $\frac{1}{4}$	8	6
Prince of Berries.....	B	" 30....	" 11....	16	6	6
Parker Earle.....	B	" 25....	" 11....	24 $\frac{1}{2}$	8	4
Princess.....	P	" 25....	" 11....	16 $\frac{3}{4}$	6	6
Ruby	B				5	2

TABLE showing facts concerning Yield and Health of Foliage—*Con.*

Strawberries.	Sex.	Date of First Picking.	Date of Last Picking.	Yield in Boxes, from a row 60 feet long.	Leaf Rust on Foliage Burnt, Scale, 1-10.	Leaf Rust on Foliage not Burnt, Scale, 1-10.
<i>Variety.</i>						
Stayman's No. 1.....	P	June 22....	July 11....	37 $\frac{1}{2}$	9	6
Seneca Queen	B	" 22....	" 5....	36 $\frac{3}{4}$	7	6
Shirts.....	B	" 25....	" 11....	7	9	5
Standard.....	B	" 22....	" 11....	11 $\frac{1}{4}$	8	6
Sharpless.....	B	" 22....	" 11....	9 $\frac{1}{2}$	8	7
*Shuckless.....	B	" 30....	.....	$\frac{1}{4}$	6	4
Turner's Beauty.....	B	" 22....	" 3....	9 $\frac{1}{4}$	7	4
Van Deman.....	B	" 22....	" 11....	35 $\frac{1}{4}$	7	5
Warfield No. 2.....	P	" 22....	" 11....	37 $\frac{1}{2}$	7	6
Windsor Chief.....	P	" 25....	" 11....	25 $\frac{3}{4}$	5	5
Wonderful	P	" 22....	" 11....	22 $\frac{1}{4}$	5	5
West Brook.....	P	" 22....	" 5....	12 $\frac{3}{4}$	9	7
Westlawn.....	P	" 22....	" 5....	9 $\frac{3}{4}$	7	4
Williams.....	B	" 22....	" 11....	31 $\frac{3}{4}$	6	4
Wilson.....	B	" 22....	" 5....	26 $\frac{3}{4}$	6	5
Woolverton.....	B	" 25....	" 5....	8 $\frac{1}{2}$	7	5
Yale.....	B	" 30....	" 11....	6	6	4
1001.....	B	" 25....	" 11....	23	5	4
<i>Seedlings.</i>						
77/X.....	P	" 25....	" 11....	20	7	4
297/X.....	P	" 25....	" 11....	30 $\frac{1}{2}$	8	4
288/X.....	P	" 25....	" 5....	22 $\frac{1}{2}$	6	5
66/X.....	P	" 22....	" 11....	26	8	5
189/X.....	P	" 22....	" 11....	13 $\frac{1}{2}$	8	5
134/X.....	B	" 22....	" 5....	18	4	3
272/X.....	B	" 22....	" 11....	24 $\frac{1}{4}$	4	3
95/X.....	P	" 28....	" 11....	3 $\frac{3}{4}$	7	5
164/X.....	B	" 22....	" 11....	8	6	4
175/X.....	P	" 28....	" 11....	7 $\frac{1}{4}$	7	3
346/X.....	P	" 28....	" 5....	9 $\frac{3}{4}$	6	4
86/X.....	B	" 28....	" 5....	14 $\frac{1}{4}$	5	3
357/X.....	B	" 22....	" 5....	29 $\frac{1}{2}$	5	3
161/X.....	B	" 22....	" 11....	21 $\frac{1}{2}$	5	3
103/X.....	B	" 28....	" 11....	15 $\frac{3}{4}$	6	3
1/X.....	B	" 25....	" 11....	15 $\frac{1}{2}$	7	4
341/X.....	B	" 22....	" 5....	20 $\frac{1}{4}$	6	3
119/X.....	B	" 28....	" 11....	9 $\frac{1}{4}$	3	2
146/X.....	B	" 23....	" 11....	20 $\frac{1}{4}$	4	2
369/X.....	P	" 25....	" 11....	23 $\frac{3}{4}$	6	2
*6-G.....	B	" 22....	" 3....	3	9	7

* These rows were not completely filled and the yields are not comparable with the others.

TABLE showing 25 varieties giving largest yields.

Strawberries.	Sex.	Date of first picking.	Date of last picking.	Yield in boxes from a row 60 feet long.
Variety.				
Crescent.....	P	June 22..	July 11.....	40
Beverly.....	B	" 25.....	" 11.....	39 ¹ / ₂
James Vick.....	B	" 25.....	" 11.....	38 ³ / ₄
Stayman's, No. 1.....	P	" 22.....	" 11.....	37 ¹ / ₂
Warfield, No. 2.....	P	" 22.....	" 11.....	37 ¹ / ₂
Seneca Queen.....	B	" 22.....	" 5.....	36 ¹ / ₂
Bartons.....	P	" 25.....	" 11.....	35 ¹ / ₂
Van Dieman.....	B	" 22.....	" 11.....	35 ¹ / ₄
John Little.....	B	" 25.....	" 11.....	35
Martha.....	P	" 25.....	" 11.....	34 ¹ / ₂
Williams.....	B	" 22.....	" 11.....	31 ³ / ₄
New Dominion.....	B	" 25.....	" 11.....	30 ¹ / ₂
Boynton.....	P	" 22.....	" 11.....	30 ¹ / ₄
297 X.....	P	" 25.....	" 11.....	30 ¹ / ₂
Beder Wood.....	B	" 23.....	" 11.....	29 ¹ / ₂
357 X.....	B	" 22.....	" 5.....	29 ¹ / ₂
Haverland.....	B	" 22.....	" 11.....	27
Wilson.....	B	" 22.....	" 5.....	26 ¹ / ₂
Pearl.....	B	" 22.....	" 11.....	26 ¹ / ₄
66 X.....	P	" 22.....	" 11.....	26
Windsor Chief.....	P	" 25.....	" 11.....	25 ¹ / ₂
Parker Earle.....	B	" 25.....	" 11.....	24 ¹ / ₂
Itasca.....	B	" 30.....	" 11.....	24 ¹ / ₄
272 X.....	B	" 22.....	" 11.....	24 ¹ / ₄
Bubach.....	B	" 22.....	" 11.....	23 ¹ / ₂

FRUITS RECEIVED FOR EXAMINATION.

I have to acknowledge the kindness of many enthusiastic fruit growers and originators of new fruits in bringing to my attention the merits of new varieties by description, and by forwarding specimen fruits. While individual descriptions are impossible as well as inadvisable in all cases, yet I wish my correspondents to understand that their thoughtfulness is fully appreciated, and I trust will be continued, as the usefulness of this division of the farm is largely enhanced by the co-operation of fruit growers and nurserymen.

Herewith is appended a list of the most important samples of fruits received during the year. In addition to this a much larger number of specimens of named varieties have been received for identification, all of which were examined with pleasure and reported upon to the sender.

DISTRIBUTION OF POPLAR AND WILLOW CUTTINGS.

This line of work has been continued on a less extended scale than in former years, on account of the active part taken in it by the Branch Farms at Indian Head and Brandon. Two hundred and sixty-five packages, each containing 125 cuttings, were sent to farmers in Manitoba, and 215 packages to applicants residing in the North-west Territories. These have been sent out, as in other years, only in response to direct individual requests, so that there is greater assurance that they are given into the hands of those persons most likely to appreciate and care for them, and who will report the results of their experience.

ASPARAGUS AND RHUBARB SEED.

The distribution of asparagus and rhubarb seed has also been continued, much to the satisfaction of many settlers in sections remote from seedsmen and nurserymen, and also with much direct encouragement towards the more general cultivation of these useful vegetables.

HARDY APPLE AND CRAB SEED.

None of the named varieties of apples which have thus far been tried at Brandon, Manitoba, or at Indian Head, in the North-west Territories, give promise of success, though A. P. Stevenson, of Nelson, Southern Manitoba, reports some success with Russian apples and crabs. With a view of introducing seedlings of the hardiest known types of apples, a small distribution of crab and apple seed was made last spring. It is hoped that a certain percentage of the resulting seedlings will endure the climate and bear fruit, and if so the seed of this fruit should be carefully preserved and sown again. It is quite possible that in course of time varieties in a measure adapted to the climate and soil of these regions may be developed by this process. Two hundred packages were sent out with appropriate instructions for planting the seed and caring for the resulting young trees.

PLANTS AND SCIONS OF NEW FRUIT.

In accordance with the system adopted last year, a distribution of several new and desirable shrubs and fruits was made through the provincial fruit growing organizations of Ontario, Quebec and Nova Scotia. By this means the Horticultural Division of the farm is brought into a line of useful co-operative work with these societies and in touch with those most interested in the development of horticulture in the Dominion. This distribution includes only varieties which are not generally obtainable commercially in Canada, and which are considered worthy of introduction.

REPORT OF THE CHEMIST

(FRANK T. SHUTT, M.A., F.I.C., F.C.S.)

OTTAWA, December 15th, 1894.

WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the eighth annual report of the Chemical Department of the Dominion Experimental Farms.

The past year has been an exceedingly busy one, the demands made upon the department being greater than ever before. In evidence of this, and to show the increasing interest on the part of Canadian agriculturists in the chemistry of agriculture, it may be stated that no less than 256 samples have been received from farmers for examination, and reported upon. These include soils, fertilizers, well waters and agricultural products in general. The correspondence, including letters received and despatched, for the last twelve months, numbers 2,288 letters. Last year the samples received were 143, and the correspondence 1,596 letters.

These two features alone indicate the interest in and popularity of our work, and above all make plain that the information afforded has proved of value to practical farmers. This is exceedingly gratifying, since, until quite recently, the application of chemistry to agriculture has been made little of by many who might have benefited by it.

Much of the work referred to is of such a character that it cannot be here included, without unduly increasing the size of this report. Its usefulness, on that account, however, must not be minimized; for in teaching the individual we teach the future generation. Each one becomes a centre for the dissemination of knowledge.

Among the more important conventions at which I have delivered addresses may be mentioned those of

The Creameries' Association of Ontario, at Belleville, Ont.
The Dairymen's Association of Nova Scotia, at Yarmouth, N.S.
The Dairymen's Association of Eastern Ontario, at Peterborough, Ont.
The American Public Health Association, at Montreal, Que.
The Agricultural Conference of Nova Scotia, at Truro, N.S.

Several important investigations in connection with Canadian agriculture and horticulture have been carried on during the past year. The results obtained and the conclusions arrived at are given in the pages of the present report. They may be summarized as follows:—

SOILS.—A complete analysis is not made of all soil samples sent in for examination, but only of those which are thoroughly representative of large areas and have never been cropped nor manured. This restriction is necessary, owing to the very large amount of extremely careful work involved in soil analysis. Eleven of such specimens of virgin soil, comprising samples from British Columbia, Manitoba, Ontario, Quebec, Nova Scotia and Prince Edward Island, are here reported upon. Several of these are treated of at length, since the soils are typical. Rational and economic methods of improvement and manuring are recommended where deemed necessary or advisable.

A considerable number of soils are forwarded by farmers. These are subjected to a qualitative and physical examination and a report given as to their general character, suitability for certain crops, together with suggestions as to fertilizers and treatment.

SWAMP MUCK.—A chapter on the occurrence, composition and use of this material is given, together with a table of the data obtained from the analysis of samples from different parts of Canada, but chiefly from the Maritime Provinces. The attention of all farmers anxious to preserve their barnyard manure from loss of fertilizing constituents, is specially directed to this article.

SEA WEED.—To those whose farms are close to the sea, the analysis of sea weed here stated will prove of value. Its manurial worth and the best methods for applying it are given.

CONTRIBUTIONS TO HORTICULTURAL CHEMISTRY.—These include : (1) an article on the chemistry of the copper-salt fungicides, which, from the number of questions received during the past year, will I think prove of interest and value to orchardists ; (2) the results of an investigation to ascertain if arsenic from Paris green passes into solution in dilute Bordeaux mixture and ammoniacal copper carbonate ; (3) a second paper on the chemistry of the apple, which gives in detail the analyses of the fruit of four leading varieties and the deductions to be made therefrom as to fertilizers for orchards ; and (4) the results of an investigation into the composition of the strawberry plant, the data including the analyses of four prominent varieties. The last two investigations were commenced several years ago, their completion being necessarily postponed, owing to press of other work.

MISCELLANEOUS.—Analyses and brief reports of 50 samples of well waters from farmers' homesteads, examined this year, are given. Attention is again directed to the grave danger in using impure and polluted water, either for household purposes or for stock.

A short paper on methods for exterminating gophers is added. Numerous inquiries have been received this year from Manitoba and the North-west Territories respecting these pests. It is hoped that the suggestions made may prove of service to those troubled by these mischievous rodents.

I have thought it well that we should here place on permanent record our analysis of the "Mammoth Cheese," made under the direction of the Dominion Dairy Commissioner, at Perth, Ontario, and subsequently exhibited at the World's Fair, Chicago, U. S. A.

During the early months of the year, Mr. P. H. LeRossignol, B.A.Sc., the assistant chemist, fell ill. To my very great regret, his health became so shattered that he was obliged to ask for leave of absence. This was granted by the Honourable the Minister of Agriculture, and took effect on June 1st, Mr. Howard T. Barnes, B.A.Sc., of McGill College, taking his duties temporarily, until September 1st. At that date, Mr. LeRossignol was rather worse than better, and shortly after found that it would be impossible to resume work. He then sent in his resignation. Within a few weeks after that time, Mr. LeRossignol died at his home in Toronto. I wish to record my great indebtedness to him for his very faithful work while here as my assistant. He proved himself a careful and skilful worker, well versed in the theory and practice of chemistry. As an analyst, he was both rapid and accurate, and much of the work in the present report is the outcome of his enthusiastic industry.

Towards the end of November, Mr. Henry S. Marsh, Associate of the Institute of Chemistry, was appointed to the vacant post.

I have the honour to be, sir,
Your obedient servant,

FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

Chemical Laboratories,
Central Experimental Farm,
Ottawa.

VIRGIN SOILS OF CANADA.

The examination of typical soils representing large areas of territory, has been continued. From the chemical and physical data so obtained, it is possible to give information respecting the treatment and manuring most likely to be productive of good results in the districts from which the soil were sent. In addition to this immediately useful outcome of the work, it may be pointed out that we are gradually amassing figures that will lead to a better knowledge of the soils of Canada in general—a knowledge not only valuable to our own farmers, but also to those who have thoughts of emigrating from European countries.

In former reports I have dwelt at some length upon the factors which conduce to a soil's fertility. It will therefore be unnecessary for me to recapitulate here, more especially as the soils whose composition is given in the following table, are considered in detail.

The soils examined during 1894 comprise specimens from British Columbia, Manitoba, Ontario, Quebec, New Brunswick and Prince Edward Island. The results show that Canada possesses soils which compare most favourably in richness of plant food with the best and most fertile of other countries. Concerning much of the prairie soil in Manitoba and the North-west Territories, as well as regards those alluvial soils that have been formed as river deltas or tidal deposits, both on the Pacific and Atlantic coasts, it has been ascertained that they are exceedingly rich, possessing vast stores of plant food, a large portion of which is assimilable and ready to be used by crops. Many soils from other parts of the Dominion have also shown themselves to be excellent.

The analytical results are given in tabular form, and the deductions therefrom will be found, together with a brief description of each soil examined, under the various provinces from which the specimens were obtained.

BRITISH COLUMBIA.

Nos. 1 AND 2. SOILS FROM PITT MEADOWS.

PHYSICAL CHARACTERS.

Surface Soil.—A black loam in a moderately fine granular condition. When air-dried it is a grayish black and crumbles easily to powder; this on moistening does not become plastic or sticky, nor on subsequent drying does it cake.

The tilth (mechanical texture) appears to be very good, allowing freedom for root development and permeation of air and water. At the same time, it is sufficiently compact and heavy to prevent easy leaching; it is undoubtedly retentive of both moisture and fertilizing ingredients to a high degree.

The soil granules display a remarkable homogeneity, proving the very intimate incorporation of the organic matter with the inorganic basis of the soil. The sand, upon separation, appears to be very fine.

Subsoil.—A grayish yellow soil, powdering easily when air-dried. It contains a considerable amount of fine sand and does not become plastic on moistening. I should expect it to offer a very fair drainage to the surface soil.

CHEMICAL COMPOSITION.

Surface Soil.—This is a clay loam possessing a large amount of vegetable organic matter. The latter constituent is always present in arable soils; but a high percentage, as in the present instance, always characterizes soils of great fertility. Briefly, the chief functions of organic matter may be stated as follows: By its decomposition in the

soil, much plant food is set free for the use of succeeding crops, and the carbonic acid, liberated as a product of its decay, acts as a solvent (in the presence of water) in a very marked degree upon the inorganic constituents of the soil; by its nitrification, nitrates—the form in which plants take up their nitrogen—are produced; and, lastly, by its presence, the physical condition of the soil, as regards temperature and retentivity of moisture, is improved.

In *Nitrogen* this soil is particularly rich, containing almost 1·0 per cent, or nearly 34,000 pounds per acre, estimating the weight of an acre of soil to the depth of one foot to be 3,500,000 pounds. Ordinary fertile soils possess from ·2 per cent to ·5 per cent of nitrogen, and many which produce paying crops, contain indeed less than ·2 per cent of this valuable element. The physical condition of this soil is such that nitrification would proceed satisfactorily, granted that the climatic influences are favourable.

In *Potash* and *Phosphoric Acid* this soil is well supplied; in this respect comparing most favourably with soils of great productiveness.

Nitrogen, Potash and Phosphoric Acid are known as the essential elements of plant food, since successive croppings without a concomitant return of fertilizing material exhaust a soil, more particularly of these three important and costly substances.

Lime.—Many agricultural chemists consider as deficient in lime, soils containing less than one per cent. It would therefore prove in all probability, advantageous to dress this soil with lime or marl. Such an application would not only provide plant food and assist in the nitrification of the organic matter, but would correct the slight sourness which now exists. With regard to the latter character, viz., acidity, it may be remarked that it is due to the circumstances accompanying the formation of the soil. I am of the opinion that it is not strong enough to materially affect vegetation. All traces of sourness will quickly disappear with culture and aeration, and more quickly still if lime or marl be applied.

This is an alluvial deposit, composed of the detritus brought down by the Pitt River. Such soils are usually very rich and fertile, and there is no reason to suppose that this one will prove an exception. We have seen that, physically and chemically, this soil ranks with the best; its excellent qualities of tilth and richness of composition are undoubtedly owing to the peculiarly favourable circumstances attendant upon its formation and deposition.

MANITOBA.

No. 3.—VIRGIN PRAIRIE SOIL.

This sample was obtained from section 31, township 4, range 1 west, and sent to me as “representing the unfertilized and uncropped prairie soil of the Red River valley for many miles around.”

This surface soil, which is fairly uniform throughout its depth, averages a little over two feet in thickness and mixes very gradually with the subsoil, which is blue clay. The latter, as tested by boring, extends to a depth of at least 250 feet.

This soil is a deep black loam, of a fine and peculiarly characteristic granular order. It reduces easily in the air-dried condition to a grayish brown powder. Though there is present a considerable amount of undecomposed root fibre, the soil proper presents a remarkable homogeneity in appearance, indicating a process of physical refining in its formation and a uniformity in its chemical composition. Its appearance and physical condition, as well as its fertility, considered from a chemical standpoint, are no doubt due to the very intimate incorporation of the large amount of organic matter this soil possesses, with the clay and sand which constitute the basis of the soil.

On moistening the soil, it does not “puddle” nor become plastic, though it contains a considerable amount of clay; nor does it subsequently dry into a hard or “cakey” mass, which would exclude air and prevent free root development. On the evaporation of the water, the soil easily powders or rather granulates, thus evincing its extreme friability.

The value of these qualities will be seen on a brief consideration of the factors which go to make up a soil's fertility. These are (1) climatic influences (rainfall, temperature, &c.), (2) tilth or physical condition, and (3) chemical composition.

In tilth, the relative proportions of clay, sand, limestone and organic matter, play an important role, culture and the weather often materially assisting. Retentivity of moisture and fertilizing material, permeability to air and water, freedom for root growth, stability and strength with friability are among the chief qualities of well tilled soil. Though the total amount of plant food is in direct relation to the kinds and amounts of organic and inorganic materials which compose the soil, the percentage of such food immediately available for crop use is largely dependent upon tilth and climatic influence.

The importance of a good physical state is, therefore, obvious, and judging from the present sample, the tilth of this prairie soil must be regarded as of a high order.

This loam is characterized chiefly by its very high percentage of organic matter and nitrogen, and its remarkable richness in potash; it thus stands pre-eminent in two of the three essential constituents of plant food.

Experience and scientific investigation have shown that the most fertile soils the world over are invariably rich in organic matter (humus) and nitrogen. The presence of humus regulates the soil's temperature, increases its water-holding capacity, and is of much value from a physical standpoint in loosening and aerating the soil. By nitrification that valuable and important element, nitrogen, is set free in an available form—as nitrates. The decomposition of the humus in the soil also gives rise to the production of carbonic acid gas, by the agency of which, when dissolved in the soil-water, much inert inorganic material is rendered soluble and useful for plant growth.

Nitrogen.—The percentage of nitrogen may usually be considered an indication, or rather a measure, of a soil's fertility. This soil has an average depth, over a large area, of two feet, but if we calculate the weight of nitrogen in the first foot only (assuming the weight of soil to that depth over one acre to be 3,500,000 lbs.), we find a store of nitrogen that may become available amounting to 33,145 lbs. Ordinary fertile soils to a like depth contain from 3,500 to 10,000 lbs. of nitrogen per acre; hence the vast reserve of this valuable constituent in this prairie soil is apparent.

Nitrogen is essentially the fertilizer for cereals, especially when associated with phosphoric acid. It is for this reason that nitrate of soda, sulphate of ammonia, dried blood, and other sources of easily assimilated nitrogen, are so extensively used in conjunction with superphosphate for obtaining lucrative yields of the grains on partially exhausted soils.

Potash.—Soils derived from clay are usually rich in potash, and it is probably owing to this cause that this soil contains an amount of potash far in excess of that ordinarily met with. Potash is necessary for all crops, but proves especially useful for roots, grasses, clover, Indian corn and most leafy fodder crops. We may therefore infer that this soil is well adapted to raise in large quantities such food as is necessary to economically maintain stock. Using the factors already given (See table of analyses), we obtain by calculation 33,950 lbs. of potash per acre.

Phosphoric Acid.—This constituent may be considered of the greatest importance, next to nitrogen, to the wheat plant, and indeed is very effective for all cereals. In this soil it is present to an amount somewhat above the average. A calculation based on the results of the present analysis shows 9,450 lbs. to the acre.

Lime.—After the constituents already discussed, lime stands next in importance, not only because it serves directly as food for plants, but also for the reasons that it materially assists in the nitrification of the organic matter in the soil and liberates potash from its locked up sources. This soil is not rich in calcareous matter, but on the other hand must not be considered deficient—clay loam possessing as a rule from 2 per cent to 3 per cent of carbonate of lime.

It will be unnecessary to call particular attention to the percentages of the other ingredients of this soil, since this sample forms no exception to the rule that of mineral matter, other than that specially reported on here, all soils contain a sufficient amount for all the requirements of farm crops.

ONTARIO.

No. 4.—SOIL FROM NEAR PORT ARTHUR.

This is a sample of virgin soil from the farm of Mr. Wm. Wilson on the MacIntyre River near the Red River Road, about six miles west from Port Arthur, and registered as north 100 acres of Lot 24, White's survey, township of MacIntyre.

It is said to be fairly representative of the soil within a radius of five miles, though the land is reported as being somewhat heavier on the whole in the Township of Oliver, five or six miles west of the farm from which this specimen was taken. The land originally was heavily timbered, but was burnt over some twenty-five years ago, and is now covered with poplar, birch, spruce and tamarack from ten to twenty feet high. Oats, clover and root crops generally are reported by Mr. Wilson to give excellent yields.

It is a grayish red, sandy soil of very fine tilth and is free from lumps.

In the essential elements of plant food, viz., nitrogen phosphoric acid and potash, it cannot be considered a rich soil, though under proper tillage and favourable climatic influences, good returns may be expected. The percentages of these constituents lie within the limits set for good agricultural soils, but do not equal those of our more fertile soils. Owing to its physical character, it is a warm soil, and one that would in favourable seasons give an immediate and excellent response to the application of manure. From its light and sandy nature, however, it would be apt to leach readily, teaching the economy of frequent and light applications of soluble fertilizers, if such are employed, rather than heavier dressings at longer intervals. Perhaps its greatest deficiency is in humus. To improve it in this respect, the turning under of green crops, (preferably clover or pease, for such enrich the soil by nitrogen taken from the atmosphere), the application of farm-yard manure and of swamp muck (after composting, if feasible), are to be recommended. By such means, not only could the percentages of organic matter and nitrogen be increased, but the tilth would be vastly benefited, since thereby the soil becomes more retentive of moisture and fertilizing ingredients. Organic matter (humus) in a soil has many functions. In its decomposition, carbonic acid is set free, which in turn tends to liberate mineral plant food from the rock-remains in the soil. In this and many other ways does humus act beneficially, and perhaps the most economical way for the new settler to supply it, is by the ploughing under of a green crop. An application of lime or marl, with the muck or other organic manure would enhance the fertility of this soil, for though not very poor in lime, an addition of such fertilizers would assist in rendering other plant food assimilable and the soil more suitable for the growth of cereals.

If artificial manures are employed, they should be first tried on small areas. Those of a soluble nature, as nitrate of soda and kainit, should be applied as a top dressing in the spring; in this way their effect will be more marked. Since wood ashes can easily be procured, a mixture of them with ground bone might prove as cheap and effective a fertilizer as could be recommended.

Nos. 5 AND 6.—SOILS FROM MUSKOKA.

These soils are from the farm of Wm. Stalker, lot 14, concession 10, Brunel township, Muskoka, and constitute the eighth and ninth in a series of virgin soils from that district that are being investigated by us. Former reports contain analyses, and deductions therefrom, of those previously examined.

The country in which this sample was taken is well wooded with birch, maple, bass, hemlock and elm.

The surface soil is of a light gray colour, and varies from eight to twelve inches in depth. It differs from the preceding members of the series in being a clay loam, all the others having been light in character. It may be termed a strong soil and one

that is retentive of fertilizing constituents. It further differs in possessing larger amounts of lime and magnesia, features distinctly in its favour, as rendering it more suitable to the growth of cereals.

It is, however, particularly deficient in organic matter (humus), and very low in nitrogen. In potash, it is fairly rich; in phosphoric acid, only moderately so. Barn-yard manure, a rich compost made with muck, or a green crop turned under, are therefore among the best fertilizers for this land. These should be accompanied if possible with a dressing of lime or marl.

On many new farms there is not sufficient barn-yard manure made to properly keep up, not to speak of increasing, the fertility of the land in cultivation. The constant aim on such farms should be towards keeping more stock, since, by feeding the product of the fields upon the farm, about three-fourths of the plant food withdrawn by the crops is retained for future use. In the meantime, however, it would be well to practice turning under certain green crops, and thus enrich the land with available plant food. It has been explained previously that pease, clover and other legumes are particularly valuable for this purpose, adding to the soil much nitrogen assimilated from the atmosphere—a clear gain—as well as a large amount of organic matter to otherwise improve the soil. When possible, it will be more economical to feed the green crops to stock, returning the manure to the land; but if animals for this purpose are not kept, the turning under of the crop will be found to furnish a nitrogenous manure cheaper than any commercial fertilizer. The use of swamp muck may also be referred to as advantageous for such soils. In the air-dried condition it forms an excellent material for absorbing and retaining liquid manure, its own plant food constituents being converted by the subsequent fermentation in the heap into soluble and available forms.

On another page in this report will be found an article giving information respecting the agricultural value and use of this material.

QUEBEC.

Nos. 7 AND 8.—SOILS FROM THE COUNTY OF JOLIETTE.

These are from No. 766 in the official cadastral plan of the parish of Ste. Elizabeth, range St. Peter, county of Joliette.

The surface soil, about seven inches in depth, is black when moist—when it had the appearance of a clay loam of considerable strength, being compact and cohesive.

On drying in the air, it becomes grayish black and powders readily.

The subsoil when moist is plastic, but the air-dried sample reduces easily. This sample when received in the moist state was mottled gray and yellowish red. The dry powder is light yellow.

The surface soil is a clay loam of average fertility, containing all the elements necessary to plant development, and in such proportion as to produce with judicious culture remunerative crops.

Nitrogen.—The percentage of nitrogen is .213 per cent. Although the richest soils contain from .5 to 1.0 per cent, the average percentage in good fertile soils is from .15 to .25 per cent. This soil, accordingly, ranks, as regards nitrogen, among those of average fertility.

Potash.—The amount of potash is also fairly high (.38 per cent). The percentage of this element varies in soils from .1 to 1.0 per cent, according to the nature of the rock from which the soil has been derived. Clay loams are usually richer in potash than sandy soils.

Phosphoric Acid.—The phosphoric acid amounts to .27 per cent. The average in ordinary fertile soils is about .2 per cent, though, like potash, the percentage in virgin soils is dependent upon the character of the originating rock.

Nitrogen, phosphoric acid and potash are known as the essential elements of fertility, for they are those of which the soil is more particularly exhausted when succes-

sive crops are taken without a due return of plant food. Their amounts have therefore been considered in detail.

This soil is somewhat poor in *lime*, and I am of the opinion that an application of marl or lime would be beneficial, both to supply plant food and to improve the tilth.

Such a soil should be well drained. By this means, increased crop yields and greater ease in working would be obtained. Working the soil when wet, should be avoided.

It would undoubtedly prove of advantage to increase the amount of humus of the soil. This can be done with farm-yard manure, well composted swamp muck, or by turning under some green crop,—preferably clover or pease. Such organic matter contains a large amount of nitrogen, one of the most valuable of all soil constituents, and will effect an improvement not only chemically, but physically.

To sum up, this is a good soil of average fertility, and one that can be materially improved on the lines above indicated. It is a strong soil and well adapted for most agricultural crops, and more especially for cereals and fruit trees, provided that other conditions, such as the climate and season, are favourable.

The substance of this report was communicated to Mr. Rémi Hénault, who had procured and forwarded the sample early in the spring of the present year. Under date of October 22nd, he writes as follows :—

“ I am very much pleased to be able to inform you that the analysis and report that I received from you concerning my soil, have been of great service to me and the members of the Agricultural Circle of our parish. You informed me that the soil was poor in lime. I therefore applied this material at the rate of 20 bushels per acre, and as a result my crop was nearly doubled. Next year I shall plough under a growing crop of pease and also the aftermath of clover, and report results.”

It is well to remember that the continued use of lime by itself will in time exhaust the soil, since one of the functions of lime is to set free and render available locked-up plant food in the soil. It must be applied with some organic manure, a green crop turned under and swamp muck, if the future as well as the present is to be considered.

No. 9.—SOIL FROM THE COUNTY OF BONAVENTURE.

This sample from Maria, County of Bonaventure, Quebec, was obtained from newly broken land that had been cut, stumped and burnt during the summer of 1891 and 1892. Previous to this, it had been well wooded with birch, maple, spruce and pine. A third and final burning of the bush and stumps had taken place in the spring of 1893, the sample for analysis being procured in November of that year, when it was given a shallow ploughing.

It is a yellow soil, with a shade of red, evidently due to iron, and contains a large number of fragments of undecomposed rock material. Examination proved the coarse material (separated by a 1.5 mm. sieve) to be 36.63 per cent, the fine soil, of which the analysis was made, being 63.37 per cent.

In the table of analyses, it will be noticed that the percentage of clay and fine sand is 40.92. The microscope shows that a considerable part of that amount is fine sand. It is, therefore, probable that the clay and sand are in such proportions as to render the soil favourable, as regards tilth, to the growth of most farm crops.

Organic Matter and Nitrogen.—Although the appearance of this soil would lead to the belief that it was deficient in these valuable constituents, analysis proved to the contrary. Usually a rough estimate of the percentage of humus can be made from the colour of the air-dried soil; the iron in this soil had been oxidized by exposure, and the colour was no longer any criterion of the soil's richness. Good soils of average fertility contain, as a rule, from 5 per cent to 10 per cent of humus and from .15 per cent to .25 per cent of nitrogen; the soil under consideration possesses 11.80 per cent of the former and .238 per cent of the latter. In these constituents, therefore, this specimen is by no means lacking, though there can be no doubt that, to a large degree, they were destroyed in the burning of the land.

Lime.—From the analysis, this soil shows a deficiency in lime, one per cent being considered a minimum limit for the best returns. Lime may be supplied either as such, or in the form of marl or gypsum, and would be useful, not only as supplying an element of plant food, but also in promoting nitrification of the organic matter.

Potash.—It is exceptionally rich in this constituent, and consequently should prove a good soil for the legumes (clover, pease, &c.), roots and leafy crops generally. No doubt, this potash has been liberated in part by the burning to which the soil was subjected.

Phosphoric acid.—The average amount in good, fertile soils is about .2 per cent, so that, as may be seen from the table, this soil, as regards this necessary and valuable plant food, is of average quality.

The comparatively large percentage of iron is worthy of remark, as denoting a capacity for the retention of phosphoric acid and potash.

Organic manures, in one or other of the forms already mentioned (such as barn-yard manure, composted muck, offal or other animal refuse, or a green crop turned under), in conjunction with an application of lime, are to be recommended as beneficial and economical. For the special fertilization of a cereal crop, soluble forms of phosphoric acid and nitrogen, such as superphosphate and nitrate of soda, might be used.

NEW BRUNSWICK.

No. 10.—VIRGIN SOIL FROM BALMORAL SETTLEMENT, RESTIGOUCHE.

This, as received, was a pale yellow soil containing a considerable number of lumps or fragments of rock of the same colour, and of various sizes up to one and a half inches in diameter. On close inspection, it was found that these irregular rock fragments consisted chiefly of felspar, partially decomposed, though showing some quartz. The soil is evidently derived from the disintegration and decay of this rock material. The soil was separated by a 2 mm. sieve, with the following results :

Fine soil.....	84.8 per cent.
Rock fragments.....	15.2 “

Except in potash, this soil must be regarded as poor in the more important elements of fertility. The percentage of potash is considerably above that found in average fertile soils ; the abundance of this useful and valuable constituent is undoubtedly due to the felspar from which the soil has originated.

The percentage of phosphoric acid is low. Bone meal, superphosphate or fish waste are perhaps the most available sources from which to supply this necessary element for plant growth.

To supply nitrogen and humus (in both of which important materials this soil is lacking), barnyard manure would, of course, prove very valuable. Air-dried muck, subsequently composted with manure, or, if sufficient manure cannot be obtained, with wood ashes and lime, is also to be highly recommended. A third method, and one that can be strongly advised, is the ploughing under of some green crop, preferably clover or pease, while in flower. A dressing of ground unburnt gypsum is often useful in giving such crops a good start. Fish waste and sea weed would also prove valuable manures for this soil.

Most agricultural chemists regard a soil to be deficient in lime when it contains less than one per cent. This soil would therefore be benefited by a dressing of lime, either as such or as marl (carbonate of lime) or as gypsum (sulphate of lime).

To sum up briefly, organic manures (such as I have mentioned in speaking of nitrogen and humus) and lime are necessary, and the addition of phosphatic fertilizers highly desirable, to render the soil more fertile. The course here suggested will, I think, prove more economical and lasting in its effects than one which includes the use of the more soluble and expensive nitrogenous fertilizers, e.g., nitrate of soda and sulphate of ammonia.

PRINCE EDWARD ISLAND.

No. 11.—SOIL FROM KING'S COUNTY.

This soil partakes of the same colour as the light red Triassic sandstone from which it is derived, and in this respect is representative of the characteristic soil of this fertile province. It differs from the preceding specimens in that it is not a truly virgin soil. Some difficulty was experienced in procuring a sample from soil which had not been cropped or manured; this one is said to fairly represent the unmanured but cultivated soil that extends over a large area in the eastern portion of the island. It was obtained from Lot or Township 53.

This soil is a light, sandy loam, of good tilth. By the use of a sieve (mesh 1.5 mm.) the following separation was effected:—

Coarse material, chiefly fragments of red sandstone...	8.3 per cent.
Fine material, chiefly fine red sand.....	91.7 “

From this sample it is of course impossible to speak of the composition of the virgin soil; but such is, however, now exceedingly limited in area. The present report will be of service to those farmers who have not in the past kept up the fertility of their land and who are now anxious to restore to the soil economically that plant food used up by the successive cropping of years.

Judged from its chemical composition, it must be considered as somewhat inferior to those of average fertility. Of the three essential elements, it is highest in potash, containing a very fair amount. In phosphoric acid, it is very low, while the percentage of nitrogen is also less than the average found in fertile soils. The amount of lime present is extremely small, and considerably less than that in any of the other samples examined.

It is evident, therefore, that besides an organic manure to supply humus and a calcareous one to furnish lime, it is necessary to add nitrogen and phosphoric acid, if the best results are to be expected.

Nitrogen and humus are most conveniently (and also most economically) supplied together, as in some organic manures, e. g. barn-yard manure, composted muck, seaweed, fish offal, etc., or a growing crop of one of the legumes (clover or pease) ploughed under. In this way not only the fertility of the soil, but its capacity for retaining plant food and moisture will be greatly increased.

Phosphoric acid may be added in the form of superphosphate or ground bone. If wood ashes are cheaply and easily procured, their application would supply both potash and phosphoric acid.

As already stated, the soil contains a very small percentage of lime. A dressing of lime, marl or gypsum would therefore undoubtedly prove remunerative. If lime is used, other fertilizers (as indicated above) must also be supplied, or in a few years the increased yield resulting from the setting free of soil plant food by the lime, will be followed by a disastrous exhaustion of the elements of fertility. Marl does not affect a soil in as marked a manner as lime, nor does it cause exhaustion to the same degree. Unlike lime it cannot do harm if applied in excess. If it is desired to manure by turning under a green crop, a coating of gypsum and kainit or of wood ashes will materially increase the yield of clover.

It is hoped to supplement this analysis by that of soils procured in different parts of the island.

ANALYSIS of Soils (air-dried) 1894.

Number.	Soil.	Locality.	Water.	Organic and Volatile Matter.	Clay and Sand.	Oxide of Iron and Alumina.	lime.	Magnesia.	Potash.	Soda.	Phosphoric acid.	Soluble Silica.	Carbonic Acid (undetermined)	Total.	Nitrogen.	Clay and Fine Sand.	Coarse Sand.
1	Surface...	Pitt Meadows, B.C.....	8.04	28.64	48.53	12.57	0.30	0.99	0.33	0.11	0.48	0.13	.....	100.12	0.967	45.05	3.48
2	Subsoil...	"	2.78	6.20	72.36	15.83	0.32	1.80	0.44	0.13	0.13	0.20	.....	100.19	0.092	61.37	10.99
3	Surface...	Sec. 31, Tp. 4, Rg. 1, W. Manitoba	6.12	24.68	53.68	10.38	1.78	1.64	0.97	0.13	0.27	0.21	0.14	100.00	0.944	23.33	30.35
4	"	" " Port Arthur, Ont.	1.32	5.51	81.32	8.78	1.25	1.15	0.24	0.19	0.14	0.13	.....	100.03	0.133	20.40	60.92
5	"	Lot 14, Con. 10, Brunel Tp., Muskoka, Ont.....	1.78	2.89	81.79	9.62	1.25	.....	0.45	0.21	0.16	0.33	.....	.....	0.082	71.32	10.47
6	Subsoil...	Lot 14, Con. 10, Brunel, Tp., Muskoka, Ont.....	1.24	2.37	85.21	7.84	1.05	1.48	0.28	0.16	0.09	0.36	.....	100.08	0.063	57.50	27.71
7	Surface...	St. Peter, Joliette, Quebec.....	2.39	7.87	78.26	8.97	0.80	0.84	0.39	0.18	0.27	0.16	.....	100.13	0.213	45.85	32.41
8	Subsoil...	"	1.60	2.06	82.58	10.43	1.03	1.20	0.43	0.22	0.28	0.19	.....	100.02	0.029	31.73	50.85
9	Surface...	Maria, Bonaventure, Quebec.....	4.58	11.80	62.35	17.98	0.10	1.78	1.12	0.15	0.18	0.27	.....	100.31	0.238	40.92	21.43
10	"	Balmoral, Restigouche, N.B.....	1.77	5.37	80.56	9.95	0.22	0.85	1.00	0.10	0.08	0.19	.....	100.09	0.111	46.31	34.23
11	"	Lot 53, King's, P.E.I.....	1.26	5.04	85.52	7.02	0.08	0.45	0.46	0.11	0.09	0.10	.....	100.13	0.105	20.42	65.10

SWAMP MUCK.

ITS ORIGIN AND COMPOSITION.

The deposits of this material that are to be found more or less in all parts of Canada have been formed by the gradual accumulation of partially decomposed vegetable matter—the remains of successive generations of plants, chiefly aquatic. The stagnant waters in which these have grown have, by virtue of a temperate climate, preserved in this semi-decayed condition much valuable plant food. In this way, vast deposits, often many feet thick, have originated which may be considered as store houses from which the farmer can obtain a liberal supply of plant food for his crop at a merely nominal cost.

It is evident from what has been said that the best samples of muck consist entirely of humus and the ash ingredients assimilated by this semi-aquatic flora. When thoroughly dried, the humus can be burnt and, the small quantity of ash (mineral matter) remains. Many specimens, however, are found to contain more or less sand and clay and other foreign and inert matters that have become incorporated with the muck during its formation. Such, of course, detract from the agricultural value of this natural fertilizer.

As might be expected, muck is found in several stages or conditions of decomposition. Some samples are so far advanced in this decay that no evidence of structure remains. This is generally the case with the lower layers of the deposit. Again, many mucks contain unchanged woody fibre. These, while not possessing much plant food that can be readily converted into available forms, serve admirably as absorbents for liquid manure, and often act beneficially in improving the tilth of certain soils. With proper treatment in the compost heap, they may be made to give up their elements of fertility, and prove of much value as a manure.

Muck is found of all shades, varying from light brown to black. The upper layers of the deposit are usually lighter in colour than those beneath. That found on the surface is also distinguished by being easily reducible to powder, when in an air-dried condition, while that found in the lower layers is frequently plastic, drying to a hard compact mass. The latter often contains organic acids that must be neutralized by lime or by exposure to air, before the muck becomes a suitable fertilizer. Freshly dug muck possesses, as a rule, large quantities of water, often as much as 80 per cent. When piled in the air, it loses the larger quantity, the air-dried material containing from 8·15 per cent of water. It is well, therefore, to dig and pile the muck in autumn. Exposure to the winter's frost will sweeten and dry it, besides materially improving its physical properties.

Viewed as a fertilizer, its chief element of value is nitrogen, contained in the humus or organic matter. Very little, if any, of this nitrogen exists in a condition immediately available for crops. It may, however, be converted into soluble forms by suitable treatment, as in the compost heap. The mineral constituents of muck, which are given up as the material decays in the soil, also afford food for plants, since they possess notable quantities of potash, phosphoric acid and lime.

MUCK COMPOST.

If possible, previous fermentation induced by composting should be brought about before the muck is applied to the land. The benefits of such a preliminary treatment are manifold. In any case, the *freshly dug* muck should not be used, for the reasons already explained. A few months' exposure sweetens, dries and improves it generally.

Alternate layers of barn-yard manure and muck of, say, six inches in depth—make an excellent compost. To such a heap should be added all the bones, carcasses of dead

animals and garbage that accrue on the farm. The whole should be kept moist and occasionally forked over. Every farm should have a compost heap, conveniently located, since it serves to keep the surroundings clean and healthy, and preserves much valuable fertilizing material that would otherwise not only go to waste, but perhaps prove a nuisance and a menace to health.

When sufficient manure is not obtainable, lime or marl and wood ashes may be substituted—the resulting compost would be poorer in nitrogen, but richer in potash than the one just described.

MUCK AS AN ABSORBENT.

The air-dried substance is extremely absorptive, many samples being capable of holding as much as 400 times their weight of liquid. It may, therefore, be used with advantage in the barn-yard, the pig-pen, cow-house or wherever the liquid manure is likely to go to waste. By such means, valuable fertilizing material is preserved, and the nitrogen of the muck, by subsequent fermentation, rendered available.

RÉSUMÉ.

In concluding this brief account of the value and uses of muck, it may be stated that, speaking generally, the value of muck is dependent upon the amount of nitrogen contained, though the percentages of humus and mineral matter present, considerably enhance the effectiveness. The humus, by its decomposition, liberates carbonic acid in the soil. This acid undoubtedly exerts a beneficial action in setting free mineral plant food. Besides acting chemically, in supplying elements of fertility, a good muck serves to mellow heavy soils by rendering them porous and permeable to air, while thereby sandy soils have their retentive and absorbent quality increased.

Whenever possible, muck should be composted before use, as thereby it is rendered much more valuable.

THE RECLAMATION OF SWAMP LANDS.

After a *thorough drainage*, which is essential, the muck will settle and become firmer and better adapted in tilth to the growth of ordinary farm crops. If the subsoil can be easily reached by the plough, a judicious mixture of it with the muck will be of benefit; otherwise a dressing of sand, clay or coal ashes may be employed to improve the tilth.

It has already been stated that muck is rich in nitrogen, it will therefore be apparent that barn-yard manure and other nitrogenous manures are not economical fertilizers for muck lands. A liberal application of lime or marl and wood ashes will, however, be productive of good results. By such treatment, lacking, but necessary, plant food is supplied, acidity corrected and nitrification of the organic matter fostered. These materials may be harrowed in after the muck has been lightly ploughed. Wood ashes, on account of their cheapness and the comparative ease with which they may be obtained in Canada, are recommended as the source of potash and phosphoric acid; but if these are not obtainable kainit or muriate of potash and superphosphate may be used.

Muck soils, after suitable treatment, have been found of special value for the growth of vegetable and root crops. If they are rendered firm and compact by good tillage, and a dressing of clay and wood ashes is added, good crops of cereals and grasses can be obtained. The ashes may be applied at the rate of 500 pounds per acre.

The subjoined table gives the percentages of essential constituents in those samples examined during the past year, together with information respecting their occurrence.

ANALYSES of Swamp Mucks (air-dried), 1894.

Number.	Nature of Material.	Locality.	Nitrogen.		Organic and Volatile matter.	Sand and clay.	Mineral matter soluble in acid.	Water.	Remarks.
			Per cent.	Pounds in one ton of air-dried muck.					
1	Swamp muck...	Searltown, P.E.I.	0.754	14.1	89.49	2.33	0.98	7.20	Pasty and homogeneous when wet ; dries to a hard tough mass of a rich brown colour.
2	"	Orwell "	1.86	37.2	73.01	1.08	11.34	14.57	About $\frac{3}{4}$ undecomposed wood fibre.
3	"	Freetown "	0.702	14.0	77.01	10.85	2.36	9.78	In two parts : upper is brown, friable, light and consists largely of woody fibre and bark ; lower is gray and decidedly earthy in character.
4	Marsh mud....	Little Sands "	0.283	5.7	.....	.....	.....	.....	Earth of a gray colour, light and sandy, some root fibres.
5	Swamp muck...	N. Carleton "	0.73	14.6	84.22	3.99	0.86	10.93	Black, not much fibre, powders easily.
6	"	Waterville, Kings Co., N.S.	1.688	33.8	75.34	10.65	6.24	7.76	Surface deposit, dark grayish brown colour.
7	"	" "	1.230	24.6	36.36	52.25	4.51	6.88	Underlying deposit, light gray colour, of the nature of a good soil.
8	"	River John, N.S....	2.106	42.1	78.91	2.31	6.23	12.50	In fine granular condition, brown colour, some undecomposed fibre.
9	"Black loam."	Clifton, N.S.....	1.56	31.2	75.40	10.22	5.49	8.89	Dark brown, somewhat acid, of good texture.
10	Swamp muck.	Little Bras d'Or, N.S.	1.01	20.2	86.39	2.90	2.23	8.48	Light brown, turfy, with a good deal of undecomposed woody fibre.
11	"	Roger's Hill, Centre, N.S....	1.10	22.0	85.77	1.31	2.14	10.78	From the border of a lake.
12	"	Middle Southampton, N.S....	1.61	32.2	44.05	30.66	7.99	17.30	" " centre "
13	"	" "	1.30	26.0	34.56	44.97	9.52	10.95	
14	"	Picton, Ont.....	1.15	23.0	28.51	2.00	63.47	6.02	Consists partly of shell marl
15	"	Lot 10, con. 1, Locheed, Ont.	1.44	28.8	70.47	0.62	11.66	17.25	Contains a small percentage of marl.
16	"	Easton's Corners, Ont.....	1.17	23.4	33.47	49.00	7.53	10.00	
17	"	Hawkesboro', Ont.....	1.60	32.0	77.28	1.62	11.37	9.73	
18	"	Regina, N.W.T.....	1.66	33.2	39.22	43.04	7.84	9.90	From the bottom of a slough.

MARL.

This naturally-occurring source of lime might be used with advantage and profit on many Canadian farms, since many of our soils require lime; and, where readily obtained, marl is the cheapest of all lime fertilizers.

It is chiefly in connection with the muck beds already referred to, that deposits, of marl are found. Thus it happens that two substances, the natural complements of each other, supplying the necessary plant food for light and sandy soils in the cheapest forms obtainable, often occur together and in proximity to those lands that would be most benefited by their application.

Marl is essentially carbonate of lime, the poorer samples containing more or less clay and inert matter. It forms a grayish white mass and frequently incloses many small shells, when it is known as shell marl.

Previous reports have given the composition of marls found in Ontario, Quebec and the Maritime Provinces; we now present the analyses of five samples sent from the vicinity of Okanagan Mission, British Columbia.

ANALYSES of Marls from British Columbia.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Moisture and volatile matter.....	·54	·50	·52	·48	·53
Insoluble residue.....	2·75	3·68	3·42	3·55	2·30
Oxide of iron and alumina.....	·75	·85	·82	1·00	·80
Lime*.....	50·35	49·45	50·05	48·75	49·60
Magnesia.....	2·07	2·51	2·66	3·10	3·33
Carbonic acid, &c., undetermined.....	43·54	43·01	42·53	43·12	43·44
	100·00	100·00	100·00	100·00	100·00
*Equivalent to carbonate of lime.....	89·91	88·30	89·37	87·05	88·57

These samples, although showing a very high percentage of carbonate of lime, are not in the best physical condition for disintegration and solution in the soil, being hard and rock-like. They are known as "indurated" marl. If, however, they were finely crushed, their application would undoubtedly be of great benefit to lands deficient in lime.

USES OF MARLS.

Lime is a necessary constituent of plant food, and consequently every fertile soil must contain this material. Marl may be used to furnish cheaply and effectively lime to soils lacking in this constituent.

Potash is another essential in the composition of plants. The lime in a soil serves to set free the potash from its insoluble forms, so that in the presence of lime or marl soils containing only a minimum of immediately available potash, may produce luxuriant crops.

Lime promotes nitrification of the organic matter (humus) of a soil. The nitrogen of humus is not in a condition assimilable by plants, but must first be converted into soluble nitrates. This is brought about by the agency of bacteria, and their development is fostered by the presence of lime in the soil. For this reason, lime or marl gives increased fertility to many soils rich in humus and otherwise of excellent composition.

The alkaline qualities of lime and marl give these substances a special value for neutralizing the acidity and altering certain injurious iron compounds existing in many marshy and low lands. Such soils are frequently also lacking in lime.

Lime and marl improve the tilth of heavy clays, flocculating the soil; this renders it permeable to air and destroys plasticity.

While the application of an *excess* of lime is very apt to do harm and to eventually exhaust a soil's fertility (unless care is taken to replace the plant food withdrawn by the crops), no injury can result from an over application of marl. The latter supplies lime in a mildly alkaline form, peculiarly adapted to the improvement of soils and for the wants of plants.

AN "EARTHY DEPOSIT"

FROM THE NORTH-WEST TERRITORIES.

This material was found on Jack-fish Creek, near Battleford, N. W. T. It occurs in "pockets" 15 inches to 18 inches below the surface of the soil, which is a gravelly loam. The pockets are reported as being variable in size, though none exceed a few feet in diameter. In appearance it is grayish white and earthy, resembling marl. When received, it was in powder and friable lumps. Locally, the substance has been used for whitewashing and cementing purposes. Its composition was ascertained to be as follows:—

ANALYSIS.

Water (dried at 100° C.).....	6.78
Loss on ignition (combined water, organic matter).....	3.51
Oxide of iron and alumina.....	1.64
Insoluble residue (clay and sand).....	9.70
Sulphate of lime*.....	24.86
Carbonate of lime.....	53.04
Magnesia.....	1.72
Potash.....	.10
Soda.....	.10
Soluble Silica.....	.12
Phosphoric acid.....	.04
	<hr/>
	100.61
	<hr/>
Nitrogen.....	.04

*Equivalent to 31.44 per cent gypsum.

This sample may be considered as consisting essentially of marl (carbonate of lime) and gypsum (sulphate of lime). Of the three more valuable elements of plant food, nitrogen, phosphoric acid and potash, it contains only very small amounts.

It would prove useful to all soils deficient in lime. (For particulars regarding the agricultural value of carbonate of lime, see under "Marl," page 161.) Gypsum, besides supplying lime, may be regarded as a fertilizer of special value for pease and clover. It is also considered to give good results with turnips, Indian corn and other leafy crops.

SEA-WEED.

(Fucus furcatus.)

A sample of sea-weed was received from Mr. Geo. R. Weir, of Smith's Cove, N. S., with a request for a report as to its value as a fertilizer. As large amounts of this material are easily obtainable by the farmers on both the eastern and western coasts of Canada, it was thought desirable to make an analysis. The chief constituents, including more particularly those which make sea-weed valuable as a manure, are stated in the following table:—

ANALYSIS of Fresh Sea-weed.

Water	63·49
Organic matter.....	27·93
Ash or mineral matter.....	8·58
	<hr/>
	100·00
	<hr/>
Nitrogen.....	·468
Phosphoric acid.....	·108
Potash.....	2·025

POUNDS of Fertilizing Constituents in One Ton of Fresh Material.

Nitrogen.....lbs.	9·36
Phosphoric acid.....	2·18
Potash.....	40·50

This must be considered a valuable manure on account of the potash and nitrogen it contains. The ease with which it decomposes in the soil, thereby liberating these constituents in a condition at once available for plant use, greatly enhances its value. It is essentially a potassic manure, though to a certain degree it may be called a complete fertilizer. For general farm crops, however, it might be supplemented with profit by bone meal, which would supply phosphoric acid. It would make an excellent material for composting purposes, but, if preferred, may be applied at once to the land. As a green manure, it would add largely to the humus in the soil and undoubtedly improve the tilth or mechanical condition of the latter.

Its best results will be given on open, porous and warm soils. It may be applied at the rate of 20 to 30 tons per acre.

To save the expense of carrying much useless water, it is advisable to allow the sea-weed to partially dry out on the shore before hauling to the farm.

When sea-weed is burnt, the organic matter, containing the nitrogen is lost, but the ash, or mineral matter, retains the phosphoric acid and potash. The percentages of important constituents, as obtained in our laboratory, are as follows:—

ANALYSIS of Ash of Sea-weed.

Oxide of iron and alumina	·66
Lime	7·69
Magnesia	6·93
Potash	23·61
Soda	44·07
Phosphoric acid	1·27
Sulphuric acid	36·94
Soluble silica	·67

The ash is seen to be much richer in potash than ordinary wood ashes.

If the farm is at such a distance from the coast as to make this substance too expensive to use in the fresh state, it will be found economical to forego the organic matter and nitrogen and reduce the sea-weed to ash, a ton of which would contain about 400 pounds of potash and 20 pounds of phosphoric acid, on the assumption that the ash contained 15 per cent moisture.

THE CHEMISTRY OF THE APPLE.

In the Annual Report of the Experimental Farms for 1890, the results of a chemical investigation into the soil constituents required by the leaf of the apple tree, are to be found.

This work was commenced with the view of eliciting such information as would assist the intelligent orchardist in a rational method of fertilizing. When the nature and amount of plant food required by the apple tree in bearing is known, the first steps towards this will have been taken.

The leaves of the following varieties were analysed: Duchess of Oldenburg, Tetofsky, Wealthy, Fameuse and Northern Spy, and their composition at two stages of growth were given.

This investigation has been continued during the past year by the chemical examination of the fruit of four of these varieties.

The mineral matter and nitrogen (which together constitute the plant food taken from the soil) annually assimilated are represented by the increase of wood, the leaves and the fruit. That contained in the leaves is or may be practically all returned to the soil, that removed by the gathering of the crop is now to be spoken of.

In order, however, to present this subject of orchard requirements and fertilization in as complete a way as possible (as well as for the sake of comparison), the table of data from the 1890 report is here reproduced. For the deductions and conclusions therefrom, the reader may be referred to the text of the report afore-mentioned.

ANALYSES OF APPLE TREE LEAVES.
Composition of the Leaf, Percentage Composition of Important Constituents in Ash.

NAME.	COMPOSITION OF LEAF.				PERCENTAGE COMPOSITION OF IMPORTANT CONSTITUENTS IN ASH.							NITROGEN.	WEIGHT OF FERTILIZING CONSTI- TUENTS IN 1,000 LBS. OF LEAVES.		
	When Gathered.	Moisture.	Organic Matter.	Ash.	Phosphoric Acid.	Potash.	Lime.	Magnesia.	Oxide of Iron.	Silica.	Nitrogen in Organic Matter.		Lbs. of Nitrogen in 1,000 lbs. Leaves.	Lbs. of Phos. Acid in 1,000 lbs. Leaves.	Lbs. of Potash in 1,000lbs. Leaves.
Duchess of Oldenburg. Tetofsky Wealthy Fameuse Northern Spy Average	1889.														
	May 25..	70.94	26.67	2.39	9.67	9.25	21.50	9.56	1.63	.92	2.87	7.65	2.31	2.21	
	" 25..	72.11	25.40	2.49	8.82	14.33	18.20	7.52	.81	1.16	2.84	7.21	2.20	3.56	
	" 25..	71.25	26.84	1.91	8.95	10.19	16.02	8.49	1.44	.93	2.98	7.99	1.71	1.94	
	" 25..	75.45	22.01	2.54	11.61	9.54	16.26	10.84	1.64	1.04	3.01	6.62	2.94	2.42	
	" 25..	72.04	25.62	2.34	13.33	.....	14.00	12.43	1.92	1.30	2.99	7.66	3.11	.....
	.....	72.36	25.31	2.33	10.47	10.82	17.40	9.77	1.49	1.07	2.94	7.42	2.45	2.52
Duchess of Oldenburg. Tetofsky. Wealthy..... Fameuse..... Northern Spy..... Average.....	1889.														
	Sept. 20..	57.30	38.75	3.95	3.00	6.35	34.80	5.62	1.43	1.00	2.48	9.61	1.18	2.50	
	" 20..	60.49	35.87	3.64	5.93	11.02	33.59	5.55	1.19	1.28	2.20	7.80	2.15	4.01	
	" 20..	60.02	36.53	3.45	5.23	13.09	22.40	5.22	1.08	.80	2.38	8.70	1.80	4.51	
	" 20..	63.45	33.15	3.40	5.64	13.65	26.35	4.16	1.56	1.05	2.50	8.28	1.91	4.63	
	" 20 .	62.30	34.85	2.85	9.31	14.04	22.40	3.50	1.80	1.57	2.84	9.89	2.65	3.99	
	.....	60.71	35.83	3.46	5.82	11.63	27.91	4.81	1.41	1.14	2.48	8.87	1.94	3.92

This table presents the composition of the leaves, together with such other information as may help to elucidate the question under consideration. After the columns containing the names of the varieties and the data when the leaves were gathered, are three columns in which is given the percentage composition of the leaf—the water, organic matter and mineral constituents. Then follow six columns, containing the percentages of the chief inorganic components of the ash. The percentages of nitrogen in the dry organic matter are then given, followed by columns depicting the amounts of nitrogen, phosphoric acid and potash contained in 1000 lbs. of the green leaf. These figures serve to show the absolute and relative values of the leaves as a fertilizer, as well as the quantities of these materials taken from the soil for the growth of the leaves.

COMPOSITION OF THE FRUIT.

The general composition, viz., the percentages of water, organic matter and ash (which make up the whole), and the amount of nitrogen, are given for the four varieties examined in the following tabulated form :—

ANALYSIS of Apples.

Name of Variety of Apple.	Water.	Organic Matter.	Ash.	Nitrogen.
Duchess of Oldenburg.....	88·61	11·14	·25	·0382
Wealthy.....	87·00	12·71	·29	·0375
Fameuse.....	85·22	14·46	·32	·0512
Northern Spy.....	87·08	12·65	·27	·0445
Average.....	86·98	12·74	·28	·0428

Although there is a great similarity in composition in the varieties examined, and none differ much from the average deduced from them all, it is of interest to note that the Fameuse is the richest in organic matter, in ash constituents and in nitrogen. The Wealthy and Northern Spy contain almost identical amounts of organic matter and ash, and the Duchess of Oldenburg has the largest percentage of water and lowest percentage of organic matter and ash.

PERCENTAGES of Important Constituents in Ash.

Name of Variety of Apple.	Phosphoric acid.	Potash.	Soda.	Oxide of Iron.	Lime.	Magnesia.	Silica.
Duchess of Oldenburg.....	8·90	53·67	3·28	1·77	5·80	5·20	·36
Wealthy.....	8·15	57·00	2·65	1·76	3·33	3·84	·63
Fameuse.....	7·19	56·25	2·56	1·26	3·55	4·03	·32
Northern Spy.....	11·68	54·11	1·94	2·13	3·86	3·99	1·11
Average.....	8·98	55·26	2·61	1·72	4·38	4·27	·60

In this table the composition of the ash in detail is given. Of its components, phosphoric acid and potash are the principal. The latter constitutes over half of the ash (55·26 per cent), while the former is about 9 per cent, the average being 8·98 per cent.

No great differences between the varieties are here to be noticed, though the Northern Spy presents some striking variations from the average. Its ash contains nearly 3 per cent more phosphoric acid, nearly 1 per cent less soda, about .5 per cent more oxide of iron and alumina, and about .5 per cent more silica than the ash of the other apples.

The ratio of the potash to the phosphoric acid in the ash of the fruit is 6 to 1 ; in the ash of the older leaves (see table), it is 2 to 1. Relatively, therefore the demands of the leaf and the fruit on the soil for these two constituents are very different. It might here be remarked that the greater quantity of the ash ingredients of the fruit is contained in the seeds and walls of the ovary, comparatively little being found in the flesh of the apple.

A comparison of this table with that showing the composition of the ash of the leaf, will reveal further interesting features. The total percentages of ash in similar weights of leaf and fruit, are as 3.46 to .28. Lime is much more abundant in the ash of the leaf, while magnesia, oxide of iron and silica are about the same, taking the older leaves for comparison.

For the purpose of a practical presentation of the subject, the data presented in the following table have been prepared :

WEIGHT of Important Fertilizing Constituents withdrawn from the soil.

Name of Variety of Apple.	Average weight per bushel in pounds.	NITROGEN.		PHOSPHORIC ACID.		POTASH.	
		Lbs. per barrel.	Lbs. per acre, or 160 barrels.	Lbs. per barrel.	Lbs. per acre, or 160 barrels.	Lbs. per barrel.	Lbs. per acre, or 160 barrels.
Duchess of Oldenburg.....	44	.046	7.359	.027	4.307	.162	25.975
Wealthy	50	.057	8.220	.032	5.181	.226	36.232
Fameuse	50	.070	11.223	.031	5.043	.256	39.456
Northern Spy.....	46	.056	9.006	.039	6.383	.185	29.570
Average.....	47.5	.057	8.952	.032	5.228	.217	32.808

NOTE.—In the above calculations the following data are used : Forty trees per acre in an orchard 25 years old yield, on an average, one hundred and sixty (160) barrels. One barrel contains 2 bushels and 3 pecks.

We have here the number of pounds of nitrogen, phosphoric acid and potash estimated as contained in one barrel of the fruit, and the amounts removed per acre by a good crop. None of the quantities are at all excessive, and the cost of returning them would not be great. The largest demand is on the potash in the soil ; next comes the nitrogen, and lastly the phosphoric acid. In the case of the leaves, the nitrogen stood first.

For the vigorous development of the tree and an abundant crop of fruit, the soil must contain these constituents in a more or less *immediately available condition*. It is for this reason, as well as to replace the exhausted plant food, that fertilizers are necessary to profitable apple growing.

Nitrogen.—To supply nitrogen, some organic manure is perhaps the most economical. Barnyard manure or the turning under a leguminous crop (the latter being rich in nitrogen) are to be recommended. Besides adding nitrogen, they furnish humus or decaying vegetable matter, which serves a useful function by liberating carbonic acid and which in turn sets free locked-up forms of mineral food. Humus, moreover, has much to do in bringing about good tilth and in the retention of soil moisture. As the period of growth and fruit development in the apple is comparatively long, organic manures in most instances will probably give better returns than those containing more soluble forms of nitrogen, such as nitrate of soda or sulphate of ammonia.

Potash and Phosphoric acid.—To furnish potash and phosphoric acid, we would first mention wood ashes. In most parts of Canada they are the cheapest form in which to purchase these constituents. Moreover, they possess them in the relative proportion best suited to tree requirements and in a condition that renders them easily available.

If wood ashes are not obtainable, kainit and muriate of potash may be substituted to supply potash ; and bone meal and superphosphate, the phosphoric acid. Bone meal contains 2 per cent to 3 per cent of nitrogen, in addition to the phosphoric acid, but requires a greater length of time in the ground to give up its constituents ; its effects naturally last longer. For this very reason it is often advocated for orchard fertilization.

Both wood ashes and bone meal furnish lime, which we have seen to be a necessary and somewhat important element.

Soils differ so much in composition, that it is impossible to state definitely the amounts of these fertilizers that should be employed in all cases. The wants of the tree for fruit and leaves have been given and the principles for an economical return of these requirements indicated. In conclusion, it may be said that the best and most profitable crops can be obtained only when the soil contains what might be thought to be a large amount of plant food, the greater part of which is more or less assimilable. A good tilth, among other advantages, tends to a good root development. In such, the rootlets are able to procure food from a much larger area than otherwise ; but in every orchard, owing to the disposition of the roots, there must of necessity be much unoccupied soil, and hence the importance of supplying liberally and in excess of that which is absolutely needed for a season's growth and fruit, those forms of plant food which we have been considering.

CHEMISTRY OF THE STRAWBERRY PLANT.

In order to ascertain the requirements of the strawberry crop and its effect upon the soil, complete analyses of four varieties of strawberries have been made. The names of these are Sharpless, Crescent, Wilson and Manchester, the whole plant, including roots, being examined. The plants were collected while in flower during the month of June, and before the fruit had appeared. They were carefully freed from adhering soil, weighed and analysed.

The subjoined table gives, in addition to other information, the percentages of water, organic matter and ash (mineral matter), which together make up the composition of the plant :—

ANALYSES of Strawberry Plants.

Name of Variety of Strawberry.	Date.	Weight of plant.	COMPOSITION OF PLANT.		
			Water.	Organic matter.	Ash.
Sharpless, whole plant, in flower.....	June 4.	3 oz.	72·79	25·15	2·06
Crescent " "	"	3½ "	70·25	27·13	2·62
Wilson " "	"	2½ "	72·80	24·89	2·31
Manchester " "	"	3½ "	73·43	24·77	1·80
Average of four varieties.....	.....	3¼ "	72·32	25·49	2·19

Water.—This, as well known, is a most important constituent to the well-being of the plant, its presence in certain proportions being absolutely essential to plant life and the performance of the functions of food digestion and assimilation. It is the vehicle by which the assimilated food is conveyed to the various tissues and organs of the plant. The importance of a plentiful supply of soil water for the growth of the plants and their abundant fructification cannot be over-estimated ; but since nature must, in ordinary cases, be depended upon for it, there is no occasion to further discuss this constituent. It may, however, be remarked that the tilth, cultivation, mulching and the presence of humus (as furnished by an organic manure) have largely to do with the conservation of soil moisture.

Organic Matter.—Since all its constituents save nitrogen are procured from the atmosphere, it is unnecessary here to consider it. Special remarks on the nitrogen contained in the strawberry plant will be made when considering the elements removed from the soil.

Ash.—This represents the mineral matter taken from the soil. Its two most essential constituents are potash and phosphoric acid.

The foregoing data call for no special comment in detail. There is a great similarity in the composition of the four varieties, the variation from the average being small.

The following interesting table gives the percentages of the important constituents in the ash :—

PERCENTAGES of Important Constituents in Ash.

Name of Variety of Strawberry.	Phos. Acid.	Potash.	Soda.	Oxide of Iron and Alumina.	Lime.	Magnesia.	Silica.
Sharpless, whole plant, in flower..	7·63	29·91	1·03	2·47	23·67	6·10	4·02
Crescent “ “	5·08	24·28	0·78	2·10	29·10	5·19	3·43
Wilson “ “	5·80	24·31	1·26	2·47	27·82	6·11	4·60
Manchester “ “	5·88	26·93	1·09	2·04	24·75	7·13	5·89
Average.....	6·09	26·36	1·04	2·24	26·33	6·13	4·49

It is here again noticeable that no great differences exist between the plants analysed. Such as occur, might be accounted for by slight variations in the composition of the soil in which they grew.

The ash of the strawberry plant contains about 6 per cent of phosphoric acid, and in the neighbourhood of 25 per cent (one-fourth its weight) of potash.

Of the less important constituents, lime takes the precedence, being equal in amount to the potash.

The comparatively large proportion of silica and of oxide of iron and alumina in the ash, are interesting from a scientific standpoint, but need not be considered here as they are elements supplied in abundance by every soil.

The next table gives the number of pounds of the three essential elements of fertility, derived from the soil and contained in the strawberry plant, per 1,000 pounds of green plants and per acre, estimating the number of plants in an acre at 50,000.

WEIGHT of Important Fertilizing Constituents withdrawn from the soil.

Name of Variety of Strawberry.	NITROGEN.		PHOSPHORIC ACID.		POTASH.	
	Lbs. per 1,000 lbs. of plants.	Lbs. per acre, at 50,000 plants.	Lbs. per 1,000 of plants.	Lbs. per acre, at 50,000 plants.	Lbs. per 1,000 lbs. of plants.	Lbs. per acre, at 50,000 plants.
Sharpless, whole plant, in flower.....	4.79	44.9	1.63	15.3	6.16	57.7
Crescent " " 	4.59	42.5	1.33	12.5	6.36	59.6
Wilson " " 	5.45	51.0	1.34	12.6	5.61	52.6
Manchester " " 	5.51	51.5	1.26	11.8	4.85	45.5
Average	5.07	47.5	1.39	13.0	5.75	53.9

Of these essential elements it is here made clear that the chief demands for the development of the plant are upon the available potash and nitrogen in the soil. The phosphoric acid stands third, the ratio of potash to phosphoric acid from our analysis being 4 to 1.

Since the plants are finally ploughed under, thus returning the substances formerly abstracted and assimilated from the soil, the only real loss, theoretically, of plant food is that contained in the fruit. The quantity of fruit obtained per acre varies widely, viz., from 75 bushels to 300 bushels, a good average yield weighing probably 10,000 lbs. From the report for 1892 of Dr. Goessmann, Director of the State Experiment Station, Amherst, Mass., U. S. A., the following averages were obtained: Ash in fruit, .52 per cent; potash in ash of fruit, 53.81 per cent; phosphoric acid in ash of fruit, 17.9 per cent. Estimating the weight of fruit at 10,000 pounds, we find that 52 pounds of mineral matter, containing 28 pounds of potash and 9 pounds of phosphoric acid, are removed per acre. The ratio here of phosphoric acid is 3 to 1. Unfortunately, the amount of the nitrogen was not ascertained.

The loss of plant food that the soil sustains through the gathering of the fruit, is not, compared with other crops, an excessive one. At the same time, it is to be remembered that the soil has to provide, in addition to those required by the fruit, the fertilizing constituents as given in the above table though, as already pointed out, the greater part of the latter will eventually return to the soil.

A soil to be well manured must contain a large excess of available plant food over and above the amount that can be utilized by the crop, since it can not be supposed that the roots will be able to absorb, by virtue of their disposition in the soil, more than a comparatively small proportion of such fertilizing ingredients.

The strawberry is usually considered an "exhausting crop"; as far as the real loss of plant food through gathering the fruit is concerned, the facts scarcely bear out this opinion. To replace or restore to the soil the substances so removed by the fruit, would not in itself require a very heavy application of manure. It is found, however, as a matter of practical experience that, to make strawberry culture successful, the soil must be fed very liberally. High manuring for strawberries is a common practice. We may advance several reasons why such is necessary and why this practice does not conflict with what has already been said and shown here.

The growing season is short, and more especially the fruiting period. During a comparatively brief time there is a large demand for immediately available forms of nitrogen, phosphoric acid and potash (and especially the first and last of these,) a demand that must be met if the best results are to be obtained. Even the richest soils contain only small amounts of such plant food, and hence the necessity for the presence in the soil of a large quantity of manure that will readily yield its fertilizing ingredients. This more particularly is found to be the case when the rainfall during the fruiting season is below the average.

Barn-yard manure is the fertilizer commonly used. This, besides furnishing nitrogen, phosphoric acid and potash, acts beneficially in improving the tilth, in supplying humus, in preserving the soil moisture and equalizing the soil temperature. To supply potash by means of barn-yard manure alone, excess over and above that required for nitrogen and phosphoric acid must be applied, since, owing to faulty methods of preservation, this manure is often used when partially leached out. This consideration would suggest that, for the rational manuring of this crop, potash in some form (wood ashes, kainit, or muriate of potash) should be used in conjunction with the barn-yard manure. Wood ashes are for many reasons to be preferred; they contain potash and phosphoric acid in excellent proportions. The amount and kind of fertilizer required depend very largely upon the season and the character of the soil.

If a drought occurs during the fruiting period, a large excess of barn-yard manure in the soil will prove most effective in retaining the soil moisture; on the other hand, a similar excess if the season is rainy and hot, will tend to the production of foliage and runners to the detriment of the fruit crop. If a soil has been devoted to strawberry culture for some years and barn-yard manure has been exclusively used as the fertilizer, the probabilities are that potash and phosphoric acid are the fertilizing constituents particularly needed. Consequently, wood ashes, or a mixture of finely ground bone and kainit or muriate of potash, as already mentioned, should be applied. Instead of the bone meal, superphosphate may be used; it furnishes the phosphoric acid in a more or less soluble condition, but unlike bone meal does not contain nitrogen. Light dressings, in the spring, of soluble nitrogen, as in nitrate of soda (say 100 lbs. to the acre) are frequently of great value, especially on poor soils.

THE COPPER SALT FUNGICIDES.

AN OUTLINE OF THEIR CHEMISTRY.

It is unnecessary to say anything here in support of the practice of spraying; the value of certain copper compounds for the preservation of orchards and vineyards from fungous foes, is every year becoming better known and more widely appreciated. Advanced orchardists the world over recognize the efficacy of the copper fungicides for keeping both foliage and fruit clean and free from injurious attacks.

That the mixture or solution used may be effective in fungicidal power, as well as non-injurious to foliage, two factors must be paid attention to:—(1) the right preparation of the fungicide, and (2) the earliness and frequency of application. It is the first of these only that we shall consider here.

As may have already been inferred, the efficacy of the fungicides is largely dependent upon their chemical composition and physical condition. These in turn are dependent upon the materials and the method of manufacture used. We may further state that a correct and intelligent preparation of the solutions and mixtures necessitates a knowledge, at least in outline, of the changes that take place under varying circumstances of manufacture. The account of these reactions which follow, though necessarily brief, will place the reader in possession of facts of great assistance for effective spraying.

BORDEAUX MIXTURE.

The source of the copper in all spraying preparations is primarily copper sulphate, commonly known as bluestone—a deep blue crystalline salt, easily soluble in water, the chemical formula of which is $\text{CuSO}_4, 5\text{H}_2\text{O}$.

Since the efficacy of copper sulphate as a fungicide has been well established—as illustrated by its beneficial action on seed wheat infected by smut spores—and since it is the basis or source of the copper in the spraying mixtures, and a material easily and cheaply obtained, the question is often asked, “Why cannot a simple solution of bluestone in water be used for spraying?” The answer may be very briefly stated. A solution of copper sulphate sufficiently strong to prevent the growth of fungous diseases would, so far as our present experience shows, prove injurious to foliage. The corrosive character of this chemical must, by precipitation or neutralization, be rendered innocuous before bluestone can be of practical value for spraying when the leaves are out. Fungicides, properly prepared, allow the application of an adequate amount of copper to prove effective and at the same time are non-injurious to foliage.

Bordeaux mixture is perhaps the best known and the most highly valued of all the copper compound fungicides. The formula as now advocated is as follows:—

Copper sulphate.	4 pounds.
Lime	4 pounds.
Water	50 gallons.

Briefly, the directions for manufacture are: The freshly burnt lime is slaked by the addition of successive small quantities of water, and then well stirred with sufficient water to make a thin, creamy mixture. This is now strained through coarse sacking into a barrel containing the dissolved copper sulphate, and then well stirred and made up with water to 50 gallons.

In order to produce a Bordeaux mixture that does not readily “settle out,” the milk of lime and the solution of bluestone should both be well diluted before mixing. Concentrated solutions cause a heavy granular precipitate, which quickly separates and falls to the bottom of the barrel.

Iron or other metal vessels should not be used for dissolving the bluestone in, nor as receptacles for the resulting mixture, since such cause decomposition, injuring both vessel and fungicide.

The reaction that takes place on mixing, is that the lime in solution precipitates the copper from the solution of bluestone as an insoluble compound—cupric hydrate—the sulphuric acid combining with the lime to form sulphate of lime, which on account of its slight solubility remains to a very large extent in suspension. This reaction is represented by the following chemical equation:—



By reason of the slight solubility of lime—1 part in 750 parts of water—the fifty gallons cannot hold in solution at once the amount of lime necessary to precipitate, or throw out of solution, the four parts of bluestone. Since, however, the sulphate of lime for the most part separates out as it is formed, the same water again takes up lime, which causes a further precipitation of cupric hydrate. The reaction is continuous and rapid until all the copper is precipitated. Finally, we have insoluble cupric hydrate, lime (from the excess used) and sulphate of lime in a liquid containing small quantities of the two latter materials in solution.

For the sake of simplicity the reaction has been represented as a simple one, resulting in the formation of cupric hydrate and sulphate of lime. But although the above equation depicts the chief and final reaction when the Bordeaux mixture is properly made, several other compounds may be formed, according to the condition of preparation. Before the reaction is complete, or if sufficient lime is not present, basic sulphate of copper, $[\text{Cu}(\text{OH})_2, \text{CuSO}_4]$ is most probably produced. As pointed out by Professor Willard and others, the exposure of this compound to the atmosphere, as upon the foliage, results in the re-formation of corrosive sulphate of copper.

Chemistry therefore shows the necessity of an excess of lime, and further explains why an insufficiently precipitated Bordeaux mixture, though it contains no copper in solution, may prove injurious to foliage. The injury arising from the presence of the basic sulphate of copper, as pointed out by Professor Fairchild, may not appear for some time after the application, or until after the first shower.

To precipitate a definite amount of copper sulphate, a definite amount of lime is necessary—at least 3·5 ounces of freshly burnt lime for each pound of bluestone. In practice, however, in order to ensure the complete precipitation of the copper, and since impurities always exist in the commercial article, an excess of lime should be used. No element of danger is in this way introduced, as the excess of lime, when using the above formula, is not injurious to foliage. It may be pointed out that air-slacked lime contains variable and sometimes large percentages of carbonate of lime, and hence its use for this purpose is not advised. It has occasionally been suggested to use the supernatant lime water which can be poured off from the undissolved lime—lime water in fact. Fifty gallons of such saturated lime water contain only sufficient lime to precipitate (practically) two pounds of copper sulphate. Such a practice would leave copper sulphate in solution. As already remarked, it is owing to the sulphate of lime separating as it is formed, that fresh quantities of lime are dissolved and can, therefore, react with the copper compound.

Well made Bordeaux mixture should be of a deep sky-blue colour. A greenish colour denotes the presence of basic sulphate of copper and an insufficiency of lime. The clear fluid, obtained after filtration or the settling out of the cupric hydrate, should not give a brown colour with potassium ferrocyanide, proving the absence of soluble copper salts. The fluid upon exposure to air should become covered with a thin pellicle of carbonate of lime, indicating the presence of an excess of lime.

Bordeaux mixture will not keep without deterioration; changes occur that materially effect its adhesive qualities. Stock solutions of copper sulphate and milk of lime of known strengths may, however, be kept ready for dilution and mixing. They should be preserved from the atmosphere in well corked stoneware jars.

By the evaporation of the spraying solution the copper is left upon the foliage as the hydrate.

COPPER CARBONATE.

If a solution of sodium carbonate ($\text{Na}_2\text{CO}_3, 10\text{H}_2\text{O}$) be added to one of copper sulphate ($\text{CuSO}_4, 5\text{H}_2\text{O}$), the copper is thrown down as a pale green precipitate. This is “basic carbonate of copper” (a compound containing both carbonate and hydrate of copper), and has the formula, $\text{CuCO}_3, \text{CuOH}_2$. It dries to a light green, amorphous powder. In the above re-action sodium sulphate (Na_2SO_4) is formed and remains in solution.

The precipitate of basic carbonate of copper may be washed by repeated decantation, and thus freed from the sodium sulphate. Remembering that the weight of basic carbonate formed is, approximately, half that of the copper sulphate used, the addition of the required amount of water makes the spraying mixture known as “copper carbonate in suspension,” the formula of which, as recommended by Mr. Craig, is:

Basic carbonate of copper	5 ounces.
Water	50 gallons.

It is scarcely necessary to add that the form of copper salt left upon the foliage when dry is the basic carbonate ($\text{CuCO}_3, \text{CuOH}_2$).

AMMONIACAL COPPER CARBONATE.

This spraying fluid results from the solution in ammonia, of the precipitated basic carbonate of copper, just described, and subsequent dilution with the required amount of water. Two soluble compounds are formed, ammonio-cupric carbonate and ammonio-cupric hydrate, which on drying upon the foliage leave basic carbonate of copper and hydrate of copper, respectively. The formula recommended is:

Copper carbonate	5 ounces
Ammonia	2 quarts.
Water	50 gallons.

From the excellent results obtained by the use of this fungicide, it may be inferred that this fluid presents the copper compounds in a form which is at once inimical to fungus life and non-injurious to foliage.

EAU CELESTE.

This fungicide is made by adding ammonia to a solution of copper sulphate. The formula usually given for its preparation is :

Copper sulphate	1 pound.
Strong ammonia.....	1½ pints.
Water.....	22 gallons.

The first action of the ammonia is to precipitate basic copper sulphate ($\text{CuSO}_4, 2 \text{CuOH}_2$), which, however, soon dissolves in the excess of ammonia present, to form ammonio-cupric sulphate ($\text{CuSO}_4, 4\text{NH}_4 \text{OH}$), a deep blue fluid. At the same time ammonium sulphate is produced and remains in solution.

The evaporation of the fluid leaves upon the foliage basic copper sulphate and ammonium sulphate.

The fungicides, accordingly, fall into two classes. Bordeaux mixture and Copper carbonate in suspension, on the one hand, apply the copper in a more or less insoluble and precipitated form, while Ammoniacal Copper carbonate and Eau Celeste furnish it in solution. It is probable that the latter provides for a more equal distribution of the copper compounds on the leaves. From a chemical standpoint, it might be inferred that the spraying fluids containing the copper in solution, if made according to correct formulæ and applied of the proper strength, would prove more efficacious than the fluids containing the precipitated copper, though a slight variation in the strength of the latter would involve, in all probability, less risk of injury to foliage. They are more expensive and troublesome to make than Bordeaux mixture, and their use is now almost entirely restricted to a late application on grapes, cherries and pears. When the fruit is approaching maturity, the Bordeaux mixture is apt to leave a slight deposit on the fruit, which affects its sale.

AN INVESTIGATION TO ASCERTAIN IF ARSENIC FROM PARIS GREEN PASSES INTO SOLUTION IN DILUTED BORDEAUX MIXTURE AND AMMONIACAL COPPER CARBONATE.

For some time past the practice of adding Paris green to Bordeaux mixture and thus combining the properties of a fungicide and insecticide, has been in vogue with many orchardists. The economy of this method, providing the results of the treatment are satisfactory, is very apparent.

With a view of ascertaining if arsenic went into solution under such circumstances, the following formula was used :—

Copper sulphate.....	4 pounds.
Lime.....	4 “
Water	50 gallons.
Paris green.....	4 ounces.

This mixture was kept well shaken during the time of the experiment.

After two days a portion was withdrawn and filtered. The filtrate was free from even traces of arsenic. After ten days, another quantity was withdrawn and similarly treated ; analysis proved the absence of arsenic.

There is, therefore, no doubt that the arsenic under such conditions remains insoluble, and, consequently, non-injurious to foliage. The tendency evidently is (as pointed out by Kilgore and Gillette) for the lime of the Bordeaux mixture to render insoluble and inert any soluble compound of arsenic that may be present. Indeed the above authors report having largely increased the amount of Paris green added, without injury resulting to plum and peach foliage.

Judging, therefore, from a chemical standpoint, the Paris green applied with the Bordeaux mixture should be just as efficacious as when applied alone, and, further,

the addition of this insecticide should not in any way affect the usefulness of the fungicide.

Such a combined insecticide and fungicide, though exceedingly useful in the early part of the season, could not be used with safety on maturing fruit, since, the Bordeaux mixture being adhesive, the Paris green might not be detached or swept away by the wind or rain before the fruit is gathered.

Ammoniacal copper carbonate with Paris green was next tried, the insecticide being added *after the full dilution* to 50 gallons. Since Paris green is readily soluble in strong ammonia, it was scarcely expected that it would remain entirely insoluble in the solution.

The formula used was as follows :—

Copper carbonate.....	5 ounces.
Ammonia—strong	2 quarts.
Water ..	50 gallons.
Paris green.....	4 ounces.

After two days, a trace of arsenic was found in solution, which at the expiration of ten days had increased to heavy traces. No appreciable amount, however, had been dissolved.

WELL WATERS.

The knowledge of the fact that pure water is indispensable for the preservation of good health, is now public property, thanks to the medical profession, our text books on hygiene and the press. Notwithstanding, we find many otherwise intelligent and thoughtful people, totally, and we may say criminally, disregarding this matter of vital importance to themselves and their families.

Many outbreaks of typhoid fever, diphtheria and other zymotic diseases, have been directly traced to the use of a polluted water supply. It is chiefly by the means of impure water that the germs of these diseases are spread throughout a community. Evidence to prove this can be furnished by all physicians and sanitarians. Indeed we have testimony from our own data. In not a few instances where illness and death occurred from typhoid fever and diphtheria, the water supply, on analysis, was found to be seriously contaminated with drainage or soakage of a pernicious character.

If forewarned is forearmed, it is hoped that the dissemination of knowledge on this matter will lead to a better condition of rural water supplies.

The purest water undoubtedly is to be found in the country, for it is there the natural conditions prevail for its occurrence. There should be but little difficulty on the greater number of Canadian farms in obtaining an unpolluted supply. But, unfortunately, wells are often, for the sake of convenience, sunk in the barn-yard, the stable or kitchen. Or they may be dangerously near the privy, pig-pen or other polluting source. The natural result is that the well acts as a cesspit or that excrementitious and waste matter finds its way into the well. It is not unusual to find the well immediately in the rear of the house, the surrounding soil affording a temporary resting place for the kitchen slops, for which no drain has been provided. Implicit confidence is often placed in the impervious character of a clay soil: such, however, becomes in time saturated with filth and pollutes the water which passes through it.

We have examined, during the past six years, a large number samples of water from wells on Canadian farms. This useful work has been continued, and the analyses of fifty waters made in 1894 are now given in tabular form.

ANALYSES OF

RESULTS STATED

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.
1	Annapolis, N.S.	W. A. R.	Nov. 8.	trace.	0.134	traces.	6.0	60.8
2	Sandwich South, Ont.	S. S. IV., Wm. McG.	" 22.	0.75	0.17		160.0	2306.0
3	Gloucester Tp., Ont.	S. S., N. Ed.	Dec. 2.	0.112	0.02	0.02	5.1	308.8
4	"	S. S., N. Ed.	" 12.	0.08	0.02		5.2	
5	Nepean Tp., Ont.	Wm. McK.	" 28.	0.02	0.068	1.746	4.0	354.0
6	Gloucester Tp., Ont.	S. S.	Feb. 12.	0.05	0.014		2.5	
7	Admaston, Ont.	J. McC.	Jan. 29.	0.048	0.174	1.532	520.0	1498.0
8	"	R. A. J.	" 29.	0.068	0.066	1.42	75.0	596.0
9	"	J. F. M. P.	" 29.	free	0.062	1.304	440.0	1452.0
10	Nepean, Ont.	J. L. D. M.	Feb. 13.	0.24	0.113	3.23	95.0	498.8
11	"	J. L. S. W.	" 13.	0.95	0.41	0.01	51.5	425.6
12	Vernon, B.C.	L. L., 270 ft.	" 16.	0.01	0.075	traces.	5.0	342.0
13	"	L. L. S.	" 16.	0.016	0.132	0.02	7.0	210.0
14	"	Creek.	" 16.	0.016	0.032	0.07	51.5	242.0
15	"	T. W.	Mar. 17.	0.03	0.028	0.035	2.0	210.0
16	"	Well, G. O.	" 17.	free	0.024	1.23	5.5	376.0
17	"	L. L.	" 17.	0.10	0.071	0.03	2.0	164.0
18	"	Creek.	" 17.	0.02	0.02	0.058	0.5	252.0
19	Abernethy, N.W.T.	W. J. G.	" 27.	3.02	2.412		8.0	656.8
20	Hamilton, Ont.	W. G. W., No. 1.	" 30.	trace	0.055	2.588	112.0	514.0
21	"	W. G. W., No. 2.	" 30.	"	0.233	10.83	80.5	634.0
22	Rochelle, Que.	F. B.	April 12.	16.22	2.88		37.5	370.0
23	Glen Sutton, Que.	A. R.	May 16.	2.172	0.382	2.389	22.0	109.6
24	Vernon, B.C.	L. L. S., No. 1.	" 14.	free	0.04	0.026	2.6	190.0
25	"	L. L. D., No. 2.	" 14.	0.38	0.143	0.0807	2.0	187.2
26	"	H. and C., No. 3.	" 14.	3.21	0.06	0.051	4.5	554.4
27	"	T. W., Mr. H.	" 14.	free	0.03	0.1319	7.0	748.0
28	Renfrew, Ont.	D. W. B.	June 14.	0.12	0.35	14.404	800.0	2448.0
29	Hamilton, Ont.	S. Ann's, W. W., B. E. C.	" 21.	0.06	0.08		4.0	
30	"	D. W., B. E. C.	" 21.	0.2	0.032		5.5	
31	"	P. B. E. C.	July 12.	0.06	0.04	0.1977	7.0	394.0
32	"	S. Ann's, W. W., B. E. C.	" 12.	0.014	0.02	1.182	4.7	314.0
33	Lancaster, Ont.	Mrs. H.	" 18.	0.01	0.135	0.3838	11.0	360.0
34	Pembroke, Ont.	E. B.	" 20.	0.028	0.184	1.4033	110.0	256.4
35	Vernon, B.C.	No. 1, R. J. D.	" 31.	free	0.045	0.0543	1.5	194.8
36	"	No. 2, R. J. D.	" 31.	free	0.072	0.0329	2.0	192.4
37	"	No. 3, R. J. D.	" 31.	0.004	0.061	0.061	1.0	190.8
38	"	No. 4, R. J. D.	" 31.	0.004	0.037	0.016	1.0	214.4
39	Grimsby, Ont.	B. F.	Aug. 6.	0.43	0.43		333.3	
40	Rocanville, N.W.T.	J. D.	" 15.	0.892			9.6	
41	Grimsby, Ont.	B. F., H. and C.	" 17.	0.01	0.279	8.928	320.0	1791.2
42	"	B. F., No. 2.	" 17.	0.046	0.133	6.9654	326.6	3430.4
43	Winona, Ont.	A. B.	" 30.	2.37	0.276	0.7494	466.6	4988.0
44	Pense, N.W.T.	W. C. C.	Sept. 17.	0.64	0.24		19.0	3255.0
45	Whitewood, N.W.T.	J. S., Sr.	" 10.	3.39	0.20		6.2	1530.0
46	Almonte, Ont.	D. M. F.	Oct. 3.	0.01	0.085	3.69	40.0	472.0
47	Swan Creek, N.B.	J. B.	" 12.	0.28	0.081	2.0506	4.5	42.0
48	Boyne, Ont.	H. G. H., No. 1.	" 18.	1.29	0.048	0.6341	250.0	2560.0
49	"	H. G. H., No. 2.	" 18.	0.03	0.13	5.559	135.0	1156.0
50	"	H. G. H., No. 3.	" 18.	0.435	0.135	0.004	45.0	1150.0

WELL WATERS, 1894.

IN PARTS PER MILLION.

Solids after Ignition.	Loss on Ignition.	Oxygen absorbed at 80° F.		Phosphates.	Report.
		In 15'	In 4 hours.		
36.0	24.8	0.6515	1.2505	slight traces.....	A good water and perfectly wholesome for use.
1800.0	506.0	.....	.....	.....	Not pure ; unwholesome.
208.0	100.8	0.0787	0.1705	none.....	A bad water, evidently polluted.
308.0	46.0	.....	.....	.....	" " "
.....	.....	.....	.....	.....	Not a first-class water, but probably safe.
1188.0	310.0	0.9898	2.0203	heavy traces.....	A fair water, with suspicious qualities.
464.0	132.0	0.4474	0.8135	traces.....	Not a first-class water ; suspicious.
1060.0	392.0	0.3525	0.7593	".....	Could not be recommended for household or dairy use.
328.0	170.8	0.7651	1.6107	".....	Suspicious ; probably contaminated.
243.2	182.4	3.3773	6.0933	very heavy traces.	Condemned as unfit for drinking purposes.
140.0	202.0	.....	.....	traces.....	" " "
144.0	66.0	.....	.....	none.....	A good water.
172.0	70.0	.....	.....	".....	" " "
157.6	52.4	0.1320	0.1848	".....	An excellent water.
317.6	58.4	0.2376	0.2376	".....	A good water.
122.4	41.6	0.4620	0.9769	slight traces.....	Evidently polluted with drainage matter.
204.0	48.0	0.6336	1.4917	none.....	Suspicious.
403.2	253.6	.....	.....	very heavy traces..	A good water.
340.0	174.0	.....	.....	.....	Very impure ; not fit for use.
384.0	250.0	.....	.....	.....	Not a good water.
140.0	230.0	.....	.....	very heavy traces.	Seriously polluted ; not fit for use.
48.0	61.6	1.9740	3.6236	".....	Exceedingly bad ; contains liquid drainage.
128.0	62.0	0.3180	0.9540	none.....	A very bad water ; condemned.
132.0	55.2	0.3580	0.8344	very slight traces..	From surface of Long Lake ; a very good water.
410.4	144.0	0.7284	1.298	heavy traces.....	Dirty bottle had vitiated analysis.
510.0	238.0	0.1600	0.4108	traces.....	Very bad water ; condemned for drinking purposes.
1890.0	558.0	0.5325	0.5727	".....	Fairly good and safe water.
.....	.....	.....	.....	.....	Seriously polluted ; a dangerous water.
.....	.....	.....	.....	.....	Insufficient data for report.
334.0	60.0	0.1544	0.3649	slight traces.....	" " "
248.0	66.0	0.1123	0.2526	very heavy traces.	Suspicious.
262.4	97.6	0.4795	1.4375	traces.....	A wholesome and thoroughly safe drinking water.
144.4	112.0	.....	.....	heavy traces.....	A good and wholesome water, though not "first-class."
152.8	42.0	0.2580	0.7168	none.....	Suspicious, not a good water.
156.4	36.0	0.2292	0.5448	".....	Long Lake, taken at depth of 11 ft. } First-class ; wholesome ;
144.8	46.0	0.2296	0.5020	".....	" " " 5 ft. } excellent quality, no
182.4	32.0	0.4588	0.9320	".....	" " " 95 ft. } trace of conta-
.....	.....	.....	.....	.....	mination.
.....	.....	.....	.....	.....	" Deep Creek."
.....	.....	.....	.....	.....	Evidently a very bad water.
1444.0	347.2	0.8992	1.7674	heavy traces.....	Very seriously contaminated.
2920.8	509.6	0.4404	0.6512	.....	Condemned ; water dangerous to health.
4123.2	864.8	1.2526	2.5467	none.....	" " "
2745.0	510.0	.....	.....	heavy traces.....	Well receives pollution ; water not fit for use.
1265.0	265.0	.....	.....	.....	Condemned ; must receive contaminating soakage.
330.0	142.0	0.7252	1.4288	heavy traces.....	Very bad water ; very seriously polluted.
12.0	30.0	.....	.....	trace.....	Previous contamination ; unfit for household use.
2174.0	396.0	0.3316	0.8400	heavy traces.....	Seriously contaminated ; use attended with risk to health.
924.0	232.0	1.0608	1.8784	".....	Polluted ; condemned for drinking purposes.
840.0	310.0	2.3320	.....	traces.....	" " "

A brief report on the quality of the water is given to indicate the character and wholesomeness or otherwise of the samples. Reports at greater length have been furnished those who forwarded the waters.

The particulars respecting the environment of the wells are of necessity omitted, owing to their voluminous character.

It will be noticed that the samples are from all parts of Canada.

In conclusion, it may be stated that without good water, good health cannot be expected. The action of polluted water is often insidious, undermining the general health and frequently causing diarrhœa, indigestion or other intestinal disorders.

To dairymen and milkmen, pure water should, of course, be an absolute essential. The wholesomeness of milk and its products, butter and cheese, is to a large extent directly dependent upon the purity of the water used for the stock and in the subsequent dairy operations.

THE EXTERMINATION OF GOPHERS.

STRYCHNINE AS AN EXTERMINATOR.

From the correspondence received during the past season it would appear that the farmers in certain districts of Manitoba and the North-west Territories are seriously troubled by gophers destroying their field and garden crops. Many of the letters are accompanied by a sample of the strychnine to be tested for adulteration, the failure of this poison being attributed to a supposed impurity. All the specimens, however, submitted to examination have proved to be pure, and there seems to be no ground for the wide-spread belief that this article, as generally sold in commerce, is adulterated. We have, therefore, to look further for the apparent failure which we are accustomed to meet with in using strychnine.

From many analyses it appears that strychnine and strychnine sulphate are commonly sold and used for this purpose of poisoning gophers.

Strychnine is a very insoluble substance, one part requiring 6,700 parts of cold, or 2,500 parts of boiling water for solution. In other words, one gallon of cold water can hold about 10 grains, and the same quantity of hot water only 30 grains of strychnine. I think that neglect to recognize this characteristic of marked insolubility has been the chief cause of disappointment with this poison, for unless the strychnine is *in solution*, the grain cannot absorb it. A few drops of a mineral acid (sulphuric or hydrochloric), or if these are not at hand, a small quantity of strong vinegar, will much assist in dissolving the strychnine; but in such a case the solution should not be made in a metal vessel.

Strychnine sulphate is much more soluble than strychnine, one part requiring from 10 to 50 parts (according to different authors) of water for solution. As a large excess of the poison is always used, it would, therefore, seem that the strychnine sulphate would, as a rule, give more satisfactory results than strychnine.

Since poisoning by strychnine has been hitherto almost the only method practised, it will be well to consider a few important points in the preparation of the poisoned grain.

The quantity usually recommended is one ounce of strychnine to one bushel of wheat. If strychnine and not the sulphate is used, this amount appears wasteful, since 8 gallons (the equivalent of one bushel) of hot water can only carry half an ounce of strychnine and it is not at all likely that more water than wheat is used. If a small quantity of acid, or the strychnine sulphate, is used, one ounce of the material may undoubtedly be employed with advantage.

The strychnine or the strychnine sulphate, as the case may be, should first be powdered. This may be accomplished with a knife blade, piece of iron, or a glass bottle sped as a roller. Use a sufficiency of hot water, and, when the poison is *entirely* dissolved, pour the solution (of which there should be a large enough quantity to cover the grain) used the wheat. Allow the whole to stand for at least 36 hours, or until the grain has become *quite soft*, showing that the strychnine has permeated the substance of the wheat.

A teaspoonful of the poisoned wheat placed at the mouth of each burrow, should be an ample quantity.

Strychnine is an intensely bitter substance even in very dilute solutions, and no doubt the gophers are often deterred from eating the grain by tasting the poison on the outside of the wheat. Numerous correspondents have written to the effect that they cannot get these pests to touch the bait. Though I have never had the opportunity to try its efficacy, I would suggest sugar coating the pills—in other words sprinkling the poisoned and damp wheat with sugar.

To recapitulate: Care should be taken to see, in the first place, that the strychnine is all dissolved; and secondly, that the grain has become soft, showing thorough saturation with the poisoned liquid.

Of course the greatest care must be exercised when using strychnine, in order that children and farm animals may run no risk of poisoning.

CARBON BISULPHIDE AS AN EXTERMINATOR.

A method that is strongly advocated by those who have practised it in the United States is one employing carbon bisulphide. It is held to be cheaper, more efficacious and less dangerous to use than strychnine.

Carbon bisulphide is a highly inflammable liquid, with a very disagreeable smell. Though not corrosive, its vapour is detrimental to health when breathed in quantities. It, however, can be used without any danger, provided ordinary care is exercised—more especially with regard to fire and flame.

The method is as follows: Saturate a small ball of cotton waste with the bisulphide, and throw it into the burrow in the evening; then close the mouth of the hole with a little earth.

Dry balls of horse manure have been used successfully instead of cotton.

Respecting this method, I would make two quotations. Dr. C. Hart Merriam, Chief of the Division of Ornithology and Mammalogy, Washington, D.C., writes me as follows:—

“As a general rule, we do not recommend either arsenic or strychnine for the extermination of pocket gophers. We prefer the sulphide of carbon as cheaper and more efficacious. A handful of rags or waste wet with the bisulphide should be thrust into a fresh burrow; the mouth of the burrow should then be stopped. The fumes from the bisulphide being heavier than atmospheric air, float down along the tunnel to its remotest ramifications, destroying all animals there.”

In a letter from Prof. Niswander, of the Wyoming Experiment Station, I have the following testimony:—

“Over 2,000 burrows have been treated by me in 1893 by bisulphide, and 99 per cent of the trials have been successful.

“In a few instances the holes had been apparently opened from the outside, and these were all counted with the unsatisfactory trials. I have no hesitation in recommending carbon bisulphide for burrowing animals.”

Further, he says:—

“The most important thing in the use of strychnine is to get the gophers to eat it; with the bisulphide this is not necessary. Both arsenic and strychnine are dangerous to stock running loose, the bisulphide entails no such risk.”

During the early months of this summer, Mr. Mackay, Superintendent of the Experimental Farm at Indian Head, N.W.T., was asked to make some experiments with

carbon bisulphide as an exterminator. Under date of 3rd October, he writes me as follows :—

“I regret to say that my results with bisulphide are not as complete as I could have wished. It was some time before a supply could be obtained, and when it arrived, gophers were getting scarce. Further, it was then difficult to ascertain how many if any were in the holes. However, ten holes were found in which gophers were seen. In these the bisulphide was placed, according to directions, and the holes closed. Of these, two have been opened by the inmates, and eight remain closed, showing that in the latter, death to the gophers resulted. This is a *much better result* than can be obtained with strychnine, but the experiment is not sufficiently extensive to be considered conclusive.”

In view of this favourable testimony, I should advise our farmers and municipalities to give the bisulphide a trial. The retail price of bisulphide of carbon varies with the locality; in Ontario it is from 25c. to 40c. per lb. Professor Niswander, whom I have quoted above, states that it may be purchased wholesale from the manufacturer, E. R. Taylor, Cleveland, Ohio, at ten cents per lb. f. o. b. at the factory. Owing to its inflammable character, specially high rates of freight are charged. One gallon, about 10 lbs., is a quantity sufficient for 160 to 200 burrows.

STRYCHNINE FOR THE POISONING OF CROWS AND BLACKBIRDS.

Every year our farmers, more especially in the older provinces, are much annoyed by the depredations of crows. The loss sustained through the spoliation of Indian corn fields by these birds must be a large one annually. In Manitoba and the North-west Territories, the blackbird, in like manner, makes havoc in the wheat fields.

Poisoning by the use of strychnine would appear at present to be the most efficacious and economical manner of getting rid of these marauders.

Two plans for killing the crows were tried this year on the Central Experimental Farm. The first was by scattering, just before the plants appeared above the surface of the ground, corn grains that had been soaked in a solution of strychnine. In the preparation of the poisoned grain, the remarks in the foregoing chapter are strictly applicable. It must further be stated that the skin of the corn kernel is exceedingly hard and impermeable to fluids. It was accordingly found necessary to soak the grain for three days in the strychnine solution, before its tissue becomes thoroughly impregnated.

The other method consisted in chipping away a small piece of the shell from an egg and inserting a small crystal of strychnine. A small pair of forceps were found most useful for this purpose. The eggs were sunk in the soil to about three-quarters of their depth, about seven or eight being placed at intervals over an area of two acres. Crows being very fond of eggs and having a very keen sight, were soon attracted.

From one year's experiments it is scarcely possible to say which is the better plan. Both succeeded in protecting the field, *when the dead birds were allowed to lie on the field*. This work will be continued another year and results reported.

It is very probable that wheat soaked till soft in a solution of strychnine and scattered over wheat fields, would protect the latter from the ravages of the blackbird.

ANALYSIS OF THE “MAMMOTH CHEESE.”

A representative sample of the Canadian mammoth cheese, taken from the block of 70 pounds as returned from England, was found on careful analysis to have the following composition :—

Moisture.	32.06
Butter fat.	34.43
Curd (casein and albumen).	28.00
Ash, salt, milk-sugar, &c.	5.51
	<hr/>
	100.00

The cheese was perfectly sound and entirely free from skippers.

The two most important constituents in cheese are butter-fat and curd. The amounts and relative proportion of these substances not only assign to cheese its nutritive value, but upon them also depend largely its palatability and digestibility. I should judge from the analysis that this cheese was eminently satisfactory in all these particulars. English Stilton cheese (made from whole milk, to which some cream has been added) after being kept for some time contains about 29·5 per cent of fat and 24·5 per cent of curd. It is, therefore, evident that the mammoth cheese compares most favourably, both as regards heat- and flesh-producing constituents, with this well known and high-priced brand of English cheese.

REPORT OF THE ENTOMOLOGIST AND BOTANIST

JAMES FLETCHER, F.R.S.C., F.L.S.

WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially under my notice during the past season. In addition to those mentioned in the report, a great many other subjects have been studied, which will be of value on future occasions. The correspondence of this department is now very large; there were received in the year 1894 from January 1st to December 31st, 2,404 letters; and despatched during the same period, 2,465. Contained in the letters received are very valuable data and records of observations by correspondents. These although not used now are carefully preserved, and will be made use of, when the various subjects to which they refer, are treated of in full: among the latter are insect enemies of root crops, fodder crops, vegetables, forest trees and live stock; the important subjects of grasses and weeds, which have been much inquired about, will require extended treatment at an early date. It will be seen that the greater part of the work of the past season, has been with reference to fruit insects. The matter submitted herewith is such as it has appeared to me, was of the greatest importance to bring forward at once, although, in some instances, the information obtained is incomplete. In accordance with an arrangement made last spring, the work upon parasitic fungous diseases is now carried on by Mr. Craig, the Horticulturist.

In the arboretum and botanic garden, a good deal has been done during the past season. A large proportion of the part already laid out and planted, has been seeded down to grass. Extensive additions have been made to the collection of shrubs and trees, and two long borders have been prepared and graded for the reception of the collection of native and foreign perennials. It is hoped to make this an attractive feature of the botanic garden. A large collection of seeds of native plants has now been made, and next year these will be utilized for the botanic garden.

The experiments with native grasses have been continued, and much useful information with regard to the various species tried here and tested by correspondents is being placed on record. The experiments in the treatment of potato rot were this year extremely satisfactory and showed the very great advantage of spraying potatoes with Bordeaux mixture to protect them against the disease. In accordance with your instructions, I prepared for publication, early in July last, a short bulletin (Experimental Farm Notes, No. 2) on "Potato Blights." This was widely noticed through the press, and I am pleased to learn that many Canadian farmers tested the remedy and found it satisfactory. Mr. Clarence N. Goodspeed, of Peniac, N. B., writes in regard to spraying potatoes with Bordeaux mixture: "I would say that I sprayed mine twice with very good results. Our land is low and often covered with water by freshets, and seems very liable to potato disease. For the last ten or fifteen years our potatoes have rotted in the ground more or less, sometimes one-third. This year we did not find one potato diseased in our field of four acres. We had some on ground that had been planted two years, some one year, and some never planted before. In this last plot the best results were obtained, and the stalks remained quite green until the crop was dug. I am satisfied with the results obtained."

Many appreciative letters have been received from farmers testifying to the value of the information sent out from this department. I give as an example the following, which relates to one of the most injurious enemies of field crops, but at the same time

one of the most easily controlled. In the beginning of July, Mr. George Thomas, of Jones Falls, Ont., a recent settler in Canada, but who has had an extensive experience as a farmer in England, wrote for a remedy for the "cabbage worm," the caterpillar of the Imported White Cabbage Butterfly, and was recommended to use insect powder diluted with four times its weight of common flour. Reporting on his experience, Mr. Thomas says: "Only for your prompt reply, I should have been the loser of 7,000 cabbages, Brussels sprouts and cauliflowers. I find the white butterfly no respecter of sorts; but it is of conditions, as I noted it was most severe on the weakest plants. I would here respectfully suggest for such the addition of superphosphate, as it is an insecticide and cheap fertilizer, say five cwt. per acre. I think many make the mistake of using the application once and no more. I had to resort to your splendid remedy on three occasions for successive broods, and it effectually eradicated the caterpillars. I had a perfect crop, while many others in this neighbourhood lost their plants by inattention, or maybe through ignorance. I like the idea of mixing with flour, as when applied when the dew is on the leaves it adheres admirably. Such information as this you send and such as is sent by the other departments of the Experimental Farms, is, I believe, of incalculable value to the farmers of Canada, and worth thousands of dollars to those who will make use of it."

Mr. Forrest E. Caldwell, of Manotick, Ont., likewise says: "I consider the bulletin which you sent me concerning insects, has saved me a great deal of money. In the case of wire worms alone, I have two fields of ten acres each, and on these almost every grain crop I have sown for the last twenty years, has been a failure. From what I now know, since I got the farm bulletins, I recognize that the cause of this loss was wire worms and nothing else. Having followed the advice given me at the Experimental Farm, I fully believe I have been saved a considerable sum of money, and I am glad to testify to the value of the institution to all farmers who are wise enough to avail themselves of the advantages it offers. When I received the bulletin above referred to, I had just made up my mind to try a series of several experiments which I had seen recommended in newspapers, and which I now know would have been useless and expensive. By following your advice, I have been saved all this trouble and expense, as well as saved my crop."

Meetings Attended.—By permission of the Hon. Minister, I have been pleased to attend and speak at several meetings of farmers and fruit growers, and I believe that good work has been done in showing farmers the nature of my work and convincing them that it is of value to them, and that when applications are made for information concerning insects and plants, every effort will be made by the Entomologist and Botanist to assist them.

Meetings were attended at the following places:—

January.—Manotick, Ont.; Ingersoll, Ont.; Aylmer, Que.

February.—Montreal, Abbotsford, Cowansville, Chelsea, all in Quebec.

April.—Angus, Ont.; Queenston, Ont.; Knowlton, Que.; Cookshire, Que.; Danville, Que.; Richmond, Que.

June.—Jubilee Point, Rice Lake, Ont.; Riceville, Ont.; Richmond, Ont.

August.—Charlottetown, P. E. I.; Knowlton, Que.

October.—East Templeton, Que.; Aylmer, Que.

November.—London, Ont.

December.—St. Joseph de Beauce, Que.; Orillia, Ont.

Acknowledgments.—I take pleasure in again gratefully acknowledging the valuable assistance I have received from my many correspondents in all parts of the Dominion, who have much aided the work of my department by making observations and by sending me prompt notice of the occurrence of injurious insects and weeds. My thanks are also particularly due to: Mr. L. O. Howard, the United States Entomologist, and his staff, for many favours in the identification of insects, for the use of figures and for valuable publications; to my kind friend, Miss Eleanor A. Ormerod, for many courtesies and for information concerning crop attacks in England similar to some occurring in Canada, as well as for some valuable books and reports, among others the "Agricultural Zoology"

of Dr. J. Ritzema Bos, and a collection of the excellent works of Prof. Alfred Nalepa, of Linz, Austria, upon the Phytoptidæ; to Prof. T. D. A. Cockerell, of Las Cruces, New Mexico, for making a careful study of several species of Canadian Coccidæ; to Prof. T. A. Williams, of Brookings, South Dakota, for the identification of species of Aphididæ, and for the drawing of *Aphis mali*, used in this report; to Prof. L. R. Jones, of Burlington, Vermont, for a series of photographs, illustrating injuries to potatoes by fungous and insect pests.

As in previous years, I am under great obligation to Prof. John Macoun for information concerning the distribution and for identification of native plants.

The following donations have been received in this department during the year :—

W. R. Carles, Esq., British Consul, Chinkiang, China : bulbs of three species of *Lycoris*.

Mrs. Dunsterville, Allahabad, India: bulbs of the Aden lily.

S. A. Fisher, Esq., Knowlton, Quebec: bulbs of *Amaryllis* and *Eucharis amazonica*.

T. N. Willing, Esq., Calgary, Alberta: specimens of rare western plants and insects.

T. E. Bean, Esq., Laggan, Alberta do do

Prof. Comstock, Director, Arizona Experiment Station: roots of the new tanning plant, "Cañaigre," for trial in Canada.

H. B. Small, Esq., Ottawa: seeds of palms from South America.

Frank Gillmor, Esq., Kansas City, Mo.: seeds of *Nelumbium luteum*.

Miss Marion Gordon, Nanaimo, British Columbia : botanical specimens.

J. FLETCHER,

Entomologist and Botanist.

OTTAWA, 31st December, 1894.

CEREALS.

The grain crops of the Dominion have been little injured by insects during the past year. Hessian-fly and Wheat-midge attacks were noticeably less in most of the districts where inquiry was made. The American Frit-fly so destructive to spring wheat in the Ottawa district in 1890, this season could not be found in wheat, and only in small numbers in grasses.

THE GRAIN APHIS (*Siphonophora avenæ*, Fab.) has, as usual, been complained of to some extent from all provinces, but has not been the cause of serious loss. In the Maritime Provinces, particularly in Nova Scotia, a peculiar affection of oats, by which the tips of the leaves turned to a bright crimson hue, was very generally attributed to the attacks of this insect. This however, I believe, was upon insufficient evidence. I visited the Maritime Provinces early in August, and had an opportunity of examining fields of oats and wheat in Prince Edward Island. At that time, there was no trace of the Grain Aphis in the fields, and the oat plants had outgrown the disease. Mr. J. Vroom, of St. Stephen, writes: "July 21. What is the matter with the grain in this section? Nearly all the oats and barley fields are blighted, though it does not seem to be the ordinary blight which the farmers ascribe to unfavourable weather. The newspapers are saying that a 'bug' is in the stalks, but the stalks seem to me all right." Writing later, on Aug. 8, Mr. Vroom says:—"All the oat and barley fields about here are more or less affected, whether sown early or late. By newspaper reports from all the southern counties of New Brunswick, I judge that the disease is widespread, if not general, in this region. At Grand Manan, where seed time is a little later than on the mainland, the fields were quite red in July, after those in this and the neighbouring parishes had apparently recovered from the attack. When first noticed, usually when the plants were about 6 or 8 inches in height, the tips of the leaves were turning red, much redder than in the case of any blight that has been seen here in recent years. An aphis was frequently seen at the base of the diseased leaf, and was by many supposed to be the cause of the trouble. When healthy leaves succeeded and the fields were again turning green, the aphides disappeared. The fields that were under best cultivation, were least affected, the strong and rapid growth of the plants enabling them to quickly outgrow the rust."

Although the cause of this disease is not yet explainable, from such inquiries as I have been able to make, it seems to have been chiefly induced by unfavourable cold wet weather in June, followed by a hot dry period. There were also present in the crimson leaves, and probably the cause of that colour, myriads of a bacillus which was referred to on page 179 of the Experimental Farms report for 1890, in an article by Mr. B. T. Galloway, Chief of the Division of Vegetable Pathology, of the United States, in the following words:—"The germ has been repeatedly obtained from diseased oats and grown in various artificial culture media, such as nutritive gelatine, oat broth, hay infusion, etc. Inoculations with this material have produced the disease in every case. In shape, the organism is sometimes nearly round, although, as a rule, it is several times longer than broad. So very minute is it, that when magnified a thousand times, it is little larger than the head of a pin." It would appear then that the plants were reduced in vigour by unfavourable atmospheric conditions, and were then attacked by this disease, due to a definite and recognizable organism; but that, owing to the removal of the aggravating cause by the improvement of the weather, the plants, particularly and more quickly on well tilled farms, to a large extent outgrew the injury. As opposed to the theory that this disease was due to the attacks of the grain aphis, the "crimson leaf" is of such rare occurrence that, when it first appeared in 1890 as well as this season, it was universally noted as something new; on the other hand, the grain aphis is invariably present in some numbers every year and should, if it were a characteristic of their attack, always produce the crimson leaves, which it does not. Moreover, as was first pointed

out to me by Mr. John R. McKenzie, a progressive farmer, of Roger's Hill, Pictou, N.S., and since confirmed by my own inquiries, although the "red leaf" was prevalent all over the Maritime provinces, the grain aphid was not exceptionally abundant, and was much less so in some districts than is frequently the case.

WIRE WORMS (*Elateridae*). Several letters inquiring for the best remedy for wire worms have been received. The experience of the past shows that the only one of the many remedies recommended which has given any measure of success is late fall ploughing. Last spring Mr. Forrest E. Caldwell, of Manotick, Ont., called upon me, and in discussing this matter, told me that he had one field in which for the last twenty years every crop of wheat and oats had invariably been badly attacked by wire worms, but that barley and rye in the same fields, as a rule, gave a good crop. To test the immunity of rye, which it was convenient for him to sow this year, I requested him to put the land under that crop, which he did, and he now reports that it was one of the finest crops he ever saw. Fall ploughing Mr. Caldwell has found of little use in controlling wire worms.

GRASSHOPPERS (*Acrydiidae*). Early in the season several letters of complaint came in of the unusual abundance of young grasshoppers. In most districts heard from, these disappeared suddenly about midsummer. Mr. G. C. Caston, of Craighurst, Ont., attributes this to three parasites which he found occurring abundantly, and describes as the Red Mite, a hair worm and a maggot, the last two being internal parasites, and the mites attacking the insect beneath and at the base of the wings. The severest attack by grasshoppers was upon Sable Island, off Nova Scotia, and was brought to my notice by the Department of Marine and Fisheries, with a request for suggestions as to their extermination. It was stated that the locusts sent had been very abundant on Sable Island the past summer, and had injured the grass and vegetables to such an extent that the agent of the department feared there would be a scarcity of fodder for the wild ponies during the coming winter. In forwarding the specimens, Mr. J. Parsons wrote: "Some three or four years ago a few were noticed for the first time on the island; the following year there were more, and in the summer of 1893 they were numerous. This season they infest the island. All the cultivated vegetables have been injured, and the grass crop greatly reduced. Whether brought to the island in hay or by wind, or whether the eggs have hatched after being long buried, the superintendent does not know." There is no doubt, I think, that the progenitors of the present invasion



Fig. 1. The Rocky Mountain Locust.

were blown from the mainland, as they have been found at sea at a much greater distance from land. From all I can learn of the nature of Sable Island, I judge that this colony of grasshoppers could be easily controlled there by the use of hopper-dozers, as recommended on page 166 of my last year's report, in which the young could be caught and destroyed before their wings appeared. The species of grasshopper concerned was the Lesser Migratory Locust (*Melanoplus atlantis*, Riley). Fig. 1 represents the Rocky Mountain Locust; the present species closely resembles it in shape, but is one-third smaller in size.

THE PEA MOTH.

(*Semasia* sp.)

Attack.—Small whitish and slightly hairy caterpillars, when full grown about half an inch in length, frequently found inside the pods of pease about the time they are ready for table use, or a little later.

"Maggoty" or "wormy" pease are well known to the house-keeper, but it is seldom that they are sufficiently abundant in gardens to cause much complaint, and I do not think that anything has been yet written in this country upon the life history of the insect of which these "worms" are one of the preparatory stages. Owing to the

immunity of certain districts in Canada from the attacks of the Pea Weevil, *Bruchus pisi*, L., large quantities of seed pease have of late years been grown in these districts for European and American seed houses. Late last season and during the present summer, complaints have come in of the ravages of the Pea Moth, the caterpillar of which is generally spoken of in the trade as the "grub." Mr. N. H. Cowdry, an extensive grain merchant, of Lindsay, Ont., writes:—

"We have no 'pea bugs' in this section; but the 'grubs' seem to be nearly as bad a pest; our farmers know no way to prevent the attack."

Messrs. N. B. Keeney and Son, of LeRoy, N. Y., wrote to me as follows:—

"November, 18, 1893.—We are growing pease for the seed trade in the counties east of Toronto, Ont., and also in Northern Michigan. The principal obstacle we encounter in our Canadian field, is the injury by a worm which works inside the pea pod and eats the outside of the green pea when it is in suitable condition for cooking. The injury done by this worm frequently results in destroying the usefulness of from 10 to 20 per cent of the crop, and we would like to know if there is any possible means of preventing the work of this worm."

"June 29, 1894.—We shall be glad to have instructions from you and will follow same to our best ability, and we hope a remedy may be discovered for this very serious hindrance to the prosperity of Canadian pea growers. This insect has never worked, to any extent, on this side of the line, so far as we have been able to learn; nor have we ever seen it in Northern Michigan, notwithstanding we have shipped Canadian grown pease to Michigan for seed."

Several specimens of the larvæ were from time to time forwarded to me by Mr. N. H. Cowdry and Messrs. Keeney and Son's agents, and these are now passing the winter as larvæ inside their cocoons. Next spring I hope to obtain the perfect insect, which is undoubtedly a small moth and may possibly prove to be the European Pea Moth, *Semasia nebritana*, Treits. (*Grapholitha pisana*, Gn.). The preparatory stages and the habits of the insect, as far as worked out, all agree closely with those of the European species, as figured and described in Curtis's *Farm Insects*, page 348, and Miss Ormerod's valuable *Manual of Injurious Insects*, page 163. Miss Ormerod's description of the English species is as follows:—

"These caterpillars or maggots are fleshy and slightly hairy, about or somewhat more than a quarter of an inch in length, and are generally yellowish in colour, with a black head, a brown band on the ring next to the head, and eight brown dots on most of the following rings. They sometimes, however, vary in colour; in some specimens the head and the next ring are brown, and in some they are intensely black. The legs on the three rings next to the head are black."

"The caterpillars go down into the earth to change, where they spin a cocoon (that is, a kind of egg-shaped covering formed of silken threads drawn from the mouth) in which they remain till spring, when they turn to chrysalids, out of which the moths appear in June."

"The moths are rather more than half an inch in the spread of the wings, satiny, and mouse-coloured. The upper wings have a row of very short white streaks directed backwards from the front edge, and a silvery oval ring with five short black lines inside it placed near the hinder margin."

The following account of the habits of this insect is from the *Agricultural Zoology* of Dr. J. Ritzema Bos (London, 1894):—

"The moths fly about in large numbers round the pea blossoms, always a short time after sunset. The females lay one, two, or at most three eggs on a very young pod, or an ovary. In fourteen days the caterpillar is hatched, bores into the pod, and attacks the pease. The opening made in the margin of the pod closes up again. The pod generally ripens early. When it opens, the full-grown caterpillars creep out, and become pupæ in the soil, within a web, where the pupa lives through the winter. The pease attacked are always covered, while in the pod, with the coarse-grained excrement of the caterpillars, and are often united two or three together by web fibres."

Commenting on the above, Mr. Cowdry writes:—"The pods here seldom open naturally, and I think do not ripen early. The quantity of excrement and web fibres is

not so large in this country." This agrees with what I have myself seen. In fact, of a great many pods examined, I have never seen one which opened of itself; but in all cases, the larva has eaten a clean, round hole through the side of the pod, and the quantity of excrement and web is small.

In reply to a letter of inquiry, the following has been received from Professor C. H. Fernald, the eminent microlepidopterist, of Amherst, Mass.:—"I would say that I have never seen, nor heard of *Grapholitha pisana*, Gn., (more properly named *Semasia nebritana*, Treits.) in this country, nor of any similar insect attacking pease."

The species which attacks our Canadian pease appears to be widely distributed, and probably attacks also the seeds of other Leguminosæ. The extent of the injury in part of the seed-pea growing districts of Ontario is referred to in the extracts given below. The injury to pease was noticed also, west of Toronto, in Essex county, about Hamilton and London; also in several places in the province of Quebec, in Nova Scotia, very bad in some parts in New Brunswick and in Prince Edward Island. In collecting seeds of native plants for the Farm museum, I found that the seeds of *Lathyrus ochroleucus* and *L. palustris* at East Templeton, Que., were almost entirely destroyed in every pod examined; likewise at Ottawa the seeds of the new fodder plant *Lathyrus sylvestris-Wagneri* on this farm and *Vicia cracca* growing wild were seriously attacked.

As far as I can judge from the observations of the past year, the egg is probably laid upon the young forming pods, either before or soon after the flowers have fallen, but occasionally later, as Mr. Cowdry found quite small caterpillars on July 27, when most of the larvæ were full-grown. The egg is laid on the outside of the pod, and the young caterpillar eats its way into it. At that time, it is of course very small, and the hole is soon obliterated by the natural growth of the pod.

The caterpillar then begins to feed upon one of the seeds, generally at the upper end. Sometimes, only one pea is injured, but frequently two or three are more or less eaten. The caterpillar having attained full growth about the last week in July, gnaws a small round hole through the pod, from which it falls to the ground, and burrowing a short distance into the earth, spins a thin but close oval cocoon of white silk, thickly covered outside with grains of earth, in which it remains torpid until the following spring. It then changes to the chrysalis, and the perfect moth appears about the time the peas are in flower. There is only one brood in the season. The following extracts from letters by Mr. N. H. Cowdry, who is a careful observer and an experienced entomologist, give many valuable data concerning the life history of the insect:—

"June 9, 1894.—I send you by to-day's mail two pea plants, each with one pod tied up inclosing the caterpillar. Mr. Keeney, of Le Roy, N.Y., and I took a drive in the country last Saturday and looked over plenty of material, but only found the specimens sent you. It is likely, therefore, that they have not damaged the early varieties of pease this year to much extent, or the excessive rain may have diminished their numbers."

"July 17.—So far, I have not yet found the moth, but suspect that it may be identical with two specimens which I was unable to catch. They were about a third of an inch long, whitish with brown markings. Almost all the pease infested, were full sized, never very young and only partially matured. Often, however, the small pea at one end of the pod in almost matured pods would be damaged, but only those very small ones which would not mature. I could never find any trace of the caterpillar in very immature pods, only in those in which the pease were nearly or quite matured. So far, I have only examined crops of Extra Early, Alaska and American Wonder, all of which will be harvested this week.

"About when or where the egg is laid, I can give you no information, but it appears to me that the larva generally begins its work near the upper end of the pea. From the very immature larvæ that I have observed in nearly mature pease, I think it very unlikely that the egg is deposited on the flower, and I have never been able to find any trace of the passage of the caterpillar through the pod. It is very probable that numbers of the pupæ can be found under the bunches of pea straw in the fields."

"July 27.—I opened several pods in the field and noticed as before that no very immature pods were attacked. The small abortive pease in the green, partially matured

pods, were often eaten, however. The caterpillar has so far appeared to give its attention solely to partially matured pods, never to very immature pods, and (so far as I have noticed) not as yet to pods nearly or wholly dried and mature. What does this mean? I find the caterpillar (both very small and apparently nearly ready to change into a chrysalis) in almost fully developed pods, never in very ripe or very green flat ones. The assumption is that the caterpillar only works with partially matured pease. How is it then that I have never found as yet this season fully matured pods at all damaged, although I have opened several? I confess that this fact rather puzzles me.

“Now, as to the date when the caterpillar finishes its work, I send you to-day unopened a pod with a hole in it, the first which I have seen. You will probably see, when you open it, that it contains some damaged pease only and not the cause of the trouble. In the same box you will notice a caterpillar which appeared to me to be ready to pupate, and the pod in which it was contained. Judging from the perforated pod and the mature look of some of the caterpillars, I imagine that the larvæ are only now reaching full growth. Some, however, which I saw yesterday are very young, not many days old. Either the season for oviposition is very extended, or we have two species or two forms of the same moth to deal with.

“With the exception of the crop which I examined to-day, all the early varieties have been harvested. Some will be threshed very soon, others not perhaps for some weeks. I will try to find the chrysalis. I think that it will be found under straw in barns or somewhere thereabout.

“You say that only in late years the damage has been so great as to attract attention. Farmers and dealers here say the damage of late years has not been greater than before. That they have always noticed the injury and sometimes as causing more loss than now.”

“July 30.—I now want to find out where the pupæ are to be found. So far I have not found any quite mature pods with either damaged pease or caterpillars in them, probably because they matured too early to be affected, and not that the caterpillar cannot eat the hard, mature pease. In a bin of Black eyes of last year's growth I find that by far the larger number of damaged pease are quite mature, proving, I think, that the larva continues to feed on them until full grown, whether the pease are hard or not.”

“August 3.—I examined a crop of dwarf pease last Wednesday, and found that a portion grown on low land, badly stunted by wet, was very much injured by the caterpillar, while the higher portions of the field escaped serious damage from it. During the winter, when the farmers bring in their pease, I hope to get some evidence as to the influence of sowing early or late, on high or low land, &c. In a crop of dwarf pease which I examined on the 1st of August, nearly all the grubs had finished their work and left the pods.”

“October 22.—In accordance with your request of some months ago, I send you to-day some perforated pea pods. Also in a pill box the only cocoon which I have found naturally placed. It was found in a pea field, loosely attached to the under surface of a stone.

“Early pease this year escaped with very little injury from the caterpillar. The later common pease are damaged to about the same extent as in the average of former years. The damage this year is certainly less than in some seasons past, but greater than in others.”

“December 22.—The farmers here are almost all of the opinion that early sown pease escape the caterpillar better than those sown later. One or two say that very late sowing is of benefit; but this is opposed by the general opinion. Early peas are always damaged less than late pease, although I hear that early ripening varieties are sometimes badly damaged. They have, however, I believe, a much better chance than later ripening varieties. High ground is supposed to produce crops more free from ‘worm’ eaten pease than low land. Some farmers think that pease are more liable to damage in dry seasons than in wet ones. Regarding the time during which the damage is done, I do not know when it begins, but I think it only ends when the pease get too hard to gnaw. I noticed several caterpillars (one only half grown) on August 23 in a small lot of late garden pease. I opened a cocoon a few days ago, and found the

caterpillar very slightly changed. It was, of course, shorter, and with the legs much drawn in, but otherwise not at all like a chrysalis."

The following letter is from a large buyer of seed pease, and gives reliable information as to the importance of finding a remedy as soon as possible for this serious pest:

"December 31, 1894.—Replying to your valued favour of 22nd December, the damage done to the pea crop in this vicinity by the Pea Moth, concerning which I wrote you last summer, has steadily increased during the last six years until now it has come to be a very serious matter. Many crops, especially such as have to be fit for seed, contain from 5 to 25 per cent of moth-eaten pease which have to be picked out by hand at great expense, in order to make the sample a satisfactory one. I do not know of any remedy for this evil.

"Our farmers find that pease grown after pease are apt to be more seriously affected than pease grown after sod, but even in cases of this kind the damage is frequently very considerable, especially in smooth varieties of pease. Am very much in hopes your investigation may result in discoveries which will enable our farmers to successfully combat this serious enemy of the pea crop and restore the pea-growing industry to its former prosperity."—J. M. BROOKS.

Remedies.—There is little danger of this insect increasing largely and becoming a serious pest in gardens, because in most instances, the pease are picked early, and the larvæ destroyed before they are full grown. Miss Ormerod suggests that where "maggot attack is noticeable, the pea haulm should be cleared away directly the crop is gathered, so that all stray pods (which are very likely to be infested) may be cleared off the ground before the maggots leave the pods. This haulm should be carefully destroyed at once; the safest way is to burn it, and it would be a good plan to lay it along the rows where the infested peas stood and burn it there, so as to get rid at once of all grubs remaining in the pods or near the surface of the ground. For field treatment, as the haulm could not well be spared, it would be desirable if a pea growing district was infested, to plough deeply so as to bury the chrysalids deeply; or to skim the surface lightly so as to lay them open to the attacks of birds; but commonly the regular rotation of crops might be expected to prevent this infestation getting ahead." (*Manual*, p. 164.)

From my own breeding experiments as well as from Mr. Cowdry's collections in the fields, we know that this insect normally passes the winter in the fields where the pease which the caterpillars had infested, were grown. This fact seems to be recognized by pea-growers. Messrs. N. B. Keeney & Son write:—

"Le Roy, N. Y., July 24.—There seems to be a theory among farmers that pease grown on fields where pease have been previously grown are more likely to have worms than crops grown where pease have not been previously grown for some years. This would seem to confirm your belief that the caterpillars spin their cocoons near the surface of the soil."

"August 6.—We cannot give you the names of farmers who state that pease grown on land previously cropped to pease are more liable to attack from the insect under discussion than new land; but this is the general opinion among all growers, and they try to avoid growing pease after pease, as far as possible, on this account, as well as to avoid the danger of impoverishing the soil."

The above records will show the importance of three things: (1) the planting of pease as early as possible, and for a time at any rate growing the earliest ripening varieties only, in an infested locality; (2) the advisability of using every year fresh land, as far as possible removed from fields used before for the cultivation of seed pease; (3) the value of deep ploughing so as to bury the chrysalids so deep that the moths could not emerge. If, as suggested by Miss Ormerod, applications can be made to the growing crop in order to prevent the moths laying their eggs, the most suitable for the purpose would probably be carbolicized plaster, or some other carbolicized dry powder such as wood ashes or slaked lime, 1 pint of crude carbolic acid with 50 pounds of the diluent.

Mr. Cowdry writes with regard to remedies:—"I think ploughing deeply so as to bury the cocoons far enough to prevent the moths from getting to the surface, is preferable to shallow ploughing; as it is probable, if the cocoons are on the surface, that they would withstand the frost and not be a very tempting morsel for birds.

"When a crop is badly infested, I think it would be well to cut it before it is quite mature; most of the larvæ would then be taken into the barn, where the conditions would not be so favourable for their development, and those which did survive and become moths, would have less chance of doing damage next season. Harvesting when not quite mature, would not materially affect the value of the crop, which would already be damaged by the caterpillars. Sowing oats and pease together I think is well worth a careful trial, especially when good seed is required. The pease can easily be separated from the oats by a fanning mill."

THE ARMY WORM.

(*Leucania unipuncta*, Haw.)



Fig. 2—The Army Worm.

Attack.—Brown, or sometimes blackish, striped caterpillars (Fig. 2), eating the leaves and stripping the stems of grasses and many other low plants. When attacking cereals, frequently cutting off the heads. When full-grown, over an inch and a half in length, and, when occurring in large numbers, migrating in bodies from one food patch to another. On reaching full growth, the caterpillars burrow into the ground and turn to light brown chrysalids, from which in about two or three weeks the moths emerge.

These (Fig. 3) are of a warm satiny-brown colour sprinkled with minute black specks and with a small but distinct white spot in the middle of each upper wing. They are very active. When the wings are closed, the moth measures about an inch in length.

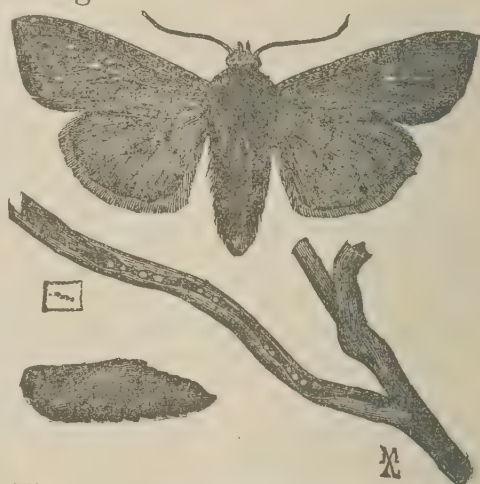


Fig. 3. — Chrysalis and moth of the Army Worm.

The life-history of the Army Worm in Canada is as follows: There are two broods in the year. Eggs are laid in autumn and hatch in ten or twelve days. After feeding for a short time, the small caterpillars, like many of the cut-worms, become torpid and pass the winter beneath tufts of grass and other low herbage. In the following spring they complete their growth, feeding on the young grass and grain crops, and produce the moths in June. These lay eggs for the second brood, which is usually much the more abundant and destructive. By the latter part of July, in this part of Canada, the young caterpillars are large enough, when abundant, to attract attention by their depredations. They are full grown by about the first week in August, when, burrowing an inch or two into the ground, they change to chrysalids and emerge as perfect moths towards the end of the month.

The chief complaints of depredations by the Army Worm this season have been received from North-western Ontario, along the line of the Canadian Pacific Railway.

"Mattawa, Ont., July 11.—Inclosed you will find specimens of a worm or caterpillar which is invading gardens and fields in myriads. It has already done considerable damage to corn, and is now attacking everything else, and I am afraid it will destroy everything, unless you can advise some remedy. We have more or less of them every season."—C. G. HURDMAN.

"Baillieboro', Ont., July 16.—I am sending you a sample of worms which have got into my pasture. They eat everything and appear to increase very rapidly. It is low, flat land, such as they call 'beaver meadow.'"—R. H. WOOD.

"Sturgeon Falls, Ont., July 17.—It is reported that a small black worm or caterpillar, about one inch long, is making considerable havoc in our locality. This insect attacks oats especially, the leaves of which it eats up, leaving only the stem; the ground is all covered with them. Last year this insect made its appearance in the neighbouring township, Caldwell; but there were none here."—JOSEPH GUÉRIN.

"Mattawa, Ont., July 23.—On a farm of mine some 26 miles from here, on the Ottawa river, an army of the most destructive bugs have made their appearance, and seem likely to entirely destroy the late sown timothy grass, oats and corn. It is a dark coloured grub, black on back, striped lengthwise with lighter markings, lighter coloured on the under side. They feed on the tender leaves of corn at night and hide in the centre of the shoots during the day, and on oats they hide under anything on the ground that affords them a shelter. They are completely destroying oats. Please let me know what can be done to stop the ravages of this, to me, new pest. Could I use an insecticide on corn?"—A. LUMSDEN.

In the reply on July 24, the insect was named, and then its habits were described. "With regard to an insecticide, it is of course very difficult to apply any remedy to such a crop as timothy, and I should imagine at this time that that crop is sufficiently advanced to be cut. The fields might then be rolled to destroy the caterpillars. It is even more difficult to make any application to corn, and the only one that occurs to me as likely to be practicable, would be dusting the plants with a mixture of Paris green and flour, wood-ashes, land plaster, or any other fine and perfectly dry powder, in the proportion of one pound of Paris green to 50 of the powder."

"August 1.—Since the reception of your letter of July 24th, I have visited my farm and found it to be an army worm that was destroying the crops there. I am anxious to know of some method of compassing their destruction, and told my farmer to follow out your suggestions, as well as one of my own, of giving them shelter under straw in the early morning and then burning it in the heat of the day, say 2 p.m. Where the oats, timothy and clover plants grow, the young feed first on the grass, then attack the oats, but rarely touch clover, as is evidenced by a field seeded to grass last year, when they first appeared. This year there is an immense growth of clover, but not one blade of timothy, and they are doing the same thing this season. I had my men kill them out of the corn, which is now getting past them. I find the grubs are now entering the second stage of their existence, and I find them in large numbers about an inch under the surface of the ground, at the roots of plants. Will these remain hybernating all fall and winter, or may we expect a destroying army this fall again? Could you suggest some method of destroying them in the soil, or would fires kept burning in June at night, catch the moths? I found the worm in destructive force as far north as the upper end of Lake Temiscamingue, 325 miles from here."—A. LUMSDEN.

The following letter was received from the *Farmer's Advocate*, of Winnipeg, with some specimens of ears of wheat, the chaff of which had been much nibbled on the outside:—

"I send by mail a few specimens of the caterpillar that has done such havoc to the wheat during the exhibition week. When I left home on Thursday, there was nothing to be seen. On Sunday the whole field was covered; by Wednesday almost every head was the same as those I inclose, and every leaf stripped from the stock. By Sunday they had pretty well disappeared, and had apparently gone into the ground to turn into the chrysalis state, and I inclose a few in that condition. They have only appeared in the new land and summer fallow, but far worse on the new land. I hope you will be able to find out what they are and say whether they are likely to appear next year."—JAMES GLENNIE.

In *The Nor'-west Farmer* for August, 1894, is an article on the Army Worm, in which the statement is made that the caterpillar was reported by visitors at the Winnipeg Industrial Exhibition to have been seen in considerable force on wheat crops 15 or 20 miles north-west of Portage la Prairie.

Remedies.—Although only occurring occasionally in excessive numbers, and then in but few localities, this moth is very widely distributed in Canada, and may generally be found in most parts in low lands where the caterpillars have suitable conditions for growth and an abundance of food. It has also been observed that the Army Worm is most abundant in wet seasons following a dry autumn, the damp weather giving them the same conditions over a large area as they would find in their own special habitat, viz., low, swampy, and grassy places.

When the caterpillars appear only in moderate numbers, they have an abundant food supply, and do not then acquire the habit of "marching," which is merely moving from one place where all the food has been devoured, to a fresh pasture. When, however, their appearance is excessive, they must of necessity move on to some other place or starve. They may be prevented from marching from one field to another by ploughing a deep furrow across their path. This should be cleared out so as to have the edge nearest to the field to be protected, perpendicular or slightly overhanging. Along the trench so formed, pits must be dug about 12 feet apart. When the caterpillars come to the trench, they are unable to climb up the opposite side, and after a few trials, walk along until they fall into the pits, when they may be destroyed by covering them with earth and tramping it down, or, as Prof. Lugg, of Minnesota, suggests, "with a liberal dose of kerosene oil and water. Even a shallow ditch will answer this purpose if the earth is made friable enough to keep the worms from ascending. If a log is dragged continually through such a ditch, nearly all the worms collected there are either killed or maimed."

If pits are not dug, where the caterpillars occur in large numbers, the trench will soon be filled, and they will walk over on the bodies of their fellows. In case any of the worms succeed in crossing the ditch, a narrow strip of the plants on the opposite side of the trench should be dusted or sprinkled with a strong mixture of Paris green diluted either with 25 times its weight of flour, ashes or land plaster, or mixed with water as strong as one ounce to a pailful of water.

When an attack has been very severe in any locality, much good may be done by burning the old grass and stubble in autumn or spring; in this way many of the young larvæ are destroyed, as well as the old stems, which it seems are the favourite place for the spring brood of moths to lay their eggs upon.

An encouraging feature in connection with an invasion by the Army Worm, is the fact that it is extremely rare for the insects to appear in large numbers two years running in the same place. This is due to the fact that they are almost invariably attended by parasitic foes, which destroy them so effectually that the occurrence of two "Army Worm years" in the same locality is almost unknown.

FRUITS.

The following concise report on the fruit crops of the year has been kindly supplied by my colleague, Mr. John Craig: "Apples were a light crop in Southern Ontario and a fair to good crop in the eastern part of the province, as well as in Quebec and Nova Scotia. There was an exceptionally large crop of pears and of unusually good quality. All young, well cultivated peach orchards gave a heavy yield; neither rot nor curculio seem to have done much damage; thinning in many instances would have been advantageous. Plums and cherries were a good crop, but suffered considerably from rot and curculio. Of small fruits, grapes yielded and ripened well everywhere; raspberries were a light crop in Eastern Ontario and Quebec, owing to injuries sustained during the previous winter. In Western and Southern Ontario the crop was light also on account of dry weather. Strawberries were injured in Central and Southern Ontario by late frost; in Eastern Ontario and Quebec the crop was heavy, but the fruit soft on account of continued wet weather during the picking season. Other small fruits yielded heavily."

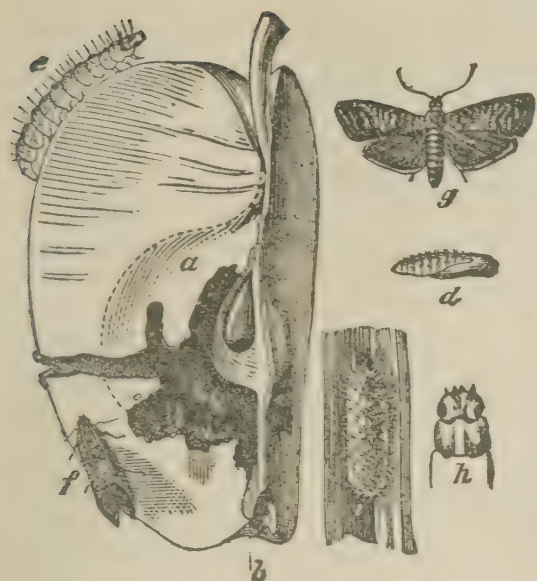


Fig. 4.—The Codling Moth.

THE CODLING MOTH (*Carpocapsa pomonella*, L. Fig. 4) was last season a cause of great loss in all parts of Canada where this insect occurs. A great many letters have been received not only concerning its depredations, but testifying to the great value of spraying with the arsenites. The experience of the past enables us to state positively that Paris green in the proportion of one pound to 200 gallons of water, to which one pound of lime has been added, sprayed over the apple trees by means of spraying pump and nozzle, at the time the eggs are laid, is the best, cheapest and most effective remedy for this insect.

Careful observations made during the last ten years convince me that in this part of Canada there is only one regular brood of this insect in the year. This is, I believe, the case as far west as Toronto. In the fruit-growing districts of

Western Ontario there are two broods. Prof. Saunders tells me that about London, Ont., during his long experience there as a fruit-grower, the second brood was invariably the more destructive. In California there are known to be at least three broods. It is claimed that so far there is no authentic record of this insect having been found breeding in British Columbia. Should it get introduced, it is probable that there would be two or three broods. The British Columbian Government have wisely adopted stringent measures to prevent the introduction of such a serious pest.

Referring to the second brood of the Codling Moth, Mr. L. Woolverton writes as follows:—

“Grimsby, Ont., Dec. 21.—The late brood of the Codling Moth did much harm to the ripening fruit and needs more careful attention in future. The injury done by this insect in Canadian orchards must amount to hundreds of thousands of dollars annually. If our practical fruit growers could be induced more generally to use faithfully those methods for insect destruction pointed out by yourself and other careful experimenters, it would result in an immense increase in the profits of their business. The trouble is that they only half try the remedies, if at all, and then lose faith because they do not secure such good results as they expect.”

As to the extent of the injury by the second brood, Mr. Murray Pettit writes:—
“Winona, Ont., Nov. 7.—In reply to your inquiry *in re* Codling Moth, the late brood was much worse this season in this locality than ever before to my knowledge. I think fully one-third of the Bartlett, Flemish Beauty and Kieffer pears ripened before attaining full size. Some dropped, and part of them were picked with those naturally ripened.”

Mr. A. W. Peart, a careful experimenter, writes as follows:—“Freeman, Ont., April 10.—As you are aware, I have been spraying for several years. Paris Green I find effective against the Codling Moth, but am not so certain about its effects on the curculio. I have used lime in water with Paris green of usual quality, and find no damage to foliage.”

“December 10.—I have sprayed for Codling Moth for many years and am satisfied that I check its ravages in a measure. This year the proportion of worms was larger than for years; but this I account for by the rains interfering with the action of the poison, and the unusually light crop of apples; the lighter the crop, the more worms relatively, is, I think, about an axiom, as well as the converse: the heavier the crop, the fewer the worms are in proportion. The curculio was also bad; in fact, I do not remember any year during the last decade, which produced so many insects and fungous pests. We shall certainly have to take more energetic measures to cope with these pests than we have in the past, if we want to make fruit growing profitable.”

The following extract is from Bulletin 52, Ontario Bureau of Industries, Toronto, November 20th, 1894 :

"Gosfield, S., Essex : There have been a few local tests of spraying apple trees. Where they have been sprayed three or four times at intervals the results have been almost marvellous—large, fine, clean, almost perfect fruit,—packers from Huron County say the best they have ever handled. On orchards near by not sprayed there have been but few apples gathered, and these hardly worth the name, being little, gnarled, wormy and scabby."

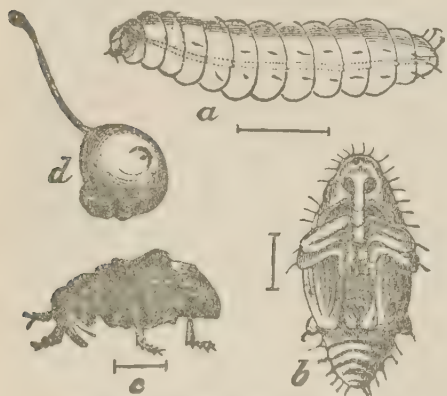


Fig. 5.—The Plum Curculio.

THE PLUM CURCULIO (*Conotrachelus nenuphar*, Herbst, fig. 5.)—Plums and apples in some districts, have been severely attacked during the season, but peaches less than usual, by the Plum Curculio. Owing to the enormous crop of peaches, the limited destruction by the curculio and rot is thought by Mr. Craig to have been a benefit to the main crop. A great many letters have been received from Ontario and Quebec, complaining of the work of this weevil on plums. Its depredations on apples were also noted. Mr. T. W. Ramm, writing from Ross Mount, Ont., on August 24, says :—
"I send you the worst specimen of an apple that has ever been seen on my place, and I had hundreds about

as bad, that either fell off early or I removed them from the tree myself. Much of this injury I attribute to the curculio ; there being no plums, the curculio stings the apples, and it is ten times worse than the Codling Moth, for it makes apples gnarled, bitter, hard and woody, in fact, utterly worthless. The experience of this year satisfies me that we must spray or cut down our trees."

Mr. Robert Jack, of Chateauguay, Quebec, gives the names of the following varieties as being particularly subject to injuries by the curculio : Duchess, Yellow Transparent, Grimes's Golden.

Although opinions differ as to the extent of immunity of a crop sprayed with Paris green from attack by the Plum Curculio, there is, no doubt, sufficient benefit to make this method still the cheapest and most practical. The following letter is from Mr. G. W. Cline, of Winona, Ont., probably one of the most extensive and successful plum growers in Ontario :—

"December 19.—My crop of plums was saved this season by spraying five times with 3 ounces Paris green to a 40 gallon barrel of water kept well stirred. I usually spray from four to six times, according to the wetness of the season, beginning at the time the covering of the young plum is just bursting open, never before, as I find the curculio does not begin to bite before warm weather, which begins about that time. I have always saved my crop for some twelve years, when I have sprayed at proper time and kept it up as required, and would not return to the jarring process again under any consideration. I never use any lime with Paris green, and never had but a few cases of trees scorched on one side, when the men were sucking the water too close to the bottom of the barrel, which had not been properly stirred. If the mixture is kept well stirred, I find no trouble in saving my crop always from the curculio."

Mr. James Stewart, of Meaford, Ont., writes :—"I have sprayed my plums for two or three years, and I have found a great benefit in so doing. Last spring I sprayed when the fruit was nicely formed, and a second time in about two weeks. As a result, I had a splendid crop of plums. I am certain there was not a pint of plums fell from the trees, and I know that some of my neighbours who did not spray, lost nearly all their plums."

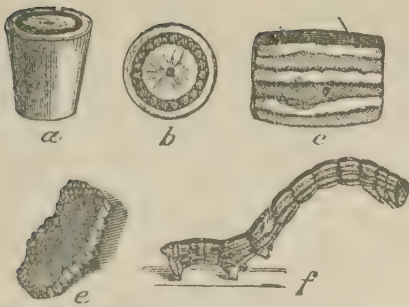


Fig. 6.—Fall Canker-worm: *a*, *b*, side and end view of egg; *c*, mass of eggs; *f*, caterpillar; *e*, enlarged segment of caterpillar.

CANKER-WORMS (*Anisopteryx*).—Reports of damage by Canker-worms have as usual been received from various districts. Identification of the exact species has in most instances been impossible. The following letter from Mr. A. W. Peart, with which specimens of the Fall Canker-worm (*A. pometaria*, Harris, Fig. 6), were forwarded, is of special interest, giving the late date in the year when the female moths were active in the Hamilton district:—

“Freeman, Ont., December 17.—I send you by this mail female Canker-worm moths. We had a sharp frost of at least 16° about November 28, and the following day, in going through the orchard, I was surprised to find many

dead moths on the trees. Their bodies were rigid and firm. Upon pressing them with the small blade of a knife, they offered such a peculiar and strong resistance that I concluded they must be frozen. There has been a heavy rain since; and the moths have been washed to the ground among the clover, and are hard to find. Living females are still climbing the trees. I first noticed the female moths climbing the trees about the middle of October, and they are still moving, though in fewer numbers at this date. In my experience, both in this and previous years, the Canker-worm is confined almost exclusively to the Northern Spy, although many other varieties of apple are adjacent to and scattered among the Spys. Spraying with me was not very satisfactory this year, on account of the frequent rain falls during the spraying season. However, I did manage to keep the Canker-worm in check fairly well by the use of Paris green, one pound to 200 gallons of water, with a little lime added.”

THE SHOT-BORER (*Xyleborus dispar*, Fab., Fig. 7.). Some useful observations have been made on the habits and life history of this injurious enemy of the apple and plum. Some of these I give herewith.

“Church Street, N. S., May 8.—Have been examining my apple trees to see if the borers are at work yet. I cannot find any nor any of their fresh work.”

“June 7.—In your last letter you wished me to keep watch for the apple borer. Have been working among young apple trees every day this spring, and on June 2, I saw the first and only one this spring, and this in a young tree in an old orchard.”—LEANDER WOODWORTH.

In 1893 Mr. Leander Woodworth wrote to me that he had seen the beetles at work on the bark on June 10.

“Berwick, N. S., December 2, 1893.—I first discovered the borers last spring, when I found 25 of my best young trees with the bark turning red, and upon examination found them full of borers. I cut down all but a few and burned them. I washed all my young trees with lime in June. Then I made a wash of soft soap, 1 gallon; water, 3 gallons; carbolic acid, $\frac{1}{2}$ pint, and washed the trees with this mixture twice in June, once in July and once in August. I have examined the trees carefully and cannot find any work of the borers this year. The trees that had the borers in them were young, healthy, fine-growing trees, as good as any that could be found in the valley.”—JOHN S. WOODWORTH.

“Berwick, N. S., December 1, 1893.—I do not know for certain at what time the borers begin to attack the trees, but I think about the end of May. As far as I know, Gravenstein trees (young ones) seem to suffer most, and I am of opinion that the borer will attack healthy trees as well as diseased ones.”—W. H. WOODWORTH.

From the above it would seem that preventive washes should be put on the trees from the beginning of May; three washes one month apart would probably be sufficient.

The OBLIQUE-BANDED LEAF-ROLLER (*Cacæcia rosaceana*, Harris) has caused considerable damage to fruit in some districts during the past season. It not unfrequently is troublesome on apple trees and currant bushes; but this year it was sent to me as an enemy of birch, apple, pear, gooseberry and black currant. Three unusual and interesting attacks were: on garden geraniums in which the leaves were eaten; on the Silver



Fig. 7.—The Shot-borer.

Maple (*Acer dasycarpum*), when the seeds only were attacked and hollowed out; and on the pear, where the caterpillars not only destroyed the leaves, but were particularly injurious to the young fruit, eating large cavities into the forming pears, in the same way as Professor Gillette describes the attack of the allied *Cacæcia argyrosyla*, Walker, on apples. (*Bul.* 19, *Colorado State Agricultural College*, 1892.) Mr. J.S. Freeman, of Freeman, Ont., in sending the specimens writes:—"June 13. The inclosed worms are eating the pears they are sent with. I believe they have destroyed $\frac{1}{10}$ of my Bartletts by eating the skin off and holes into them." Mr. C. P. Morgan, Truro, N. S., complained of them attacking his gooseberry and currant bushes, and also notes them as injuring plum and apple trees. Spraying with Paris green is an effective remedy.



Fig. 8.—The Pear Slug.

THE PEAR SLUG (*Eriocampa cerasi*, Peck, Fig. 8.) has been the cause of much injury to pear, plum and cherry trees. Mr. G. W. Henry, the well known nurseryman, of Hatzic, B. C., writes:—"Pear and cherry trees suffered badly from slugs last season; I sprayed with Paris green, which killed the slugs, but also injured many of my young trees badly, though I used at the rate of 300 gallons of

water to 1 pound of Paris green. Fruit-growers are now recognizing the danger of neglecting insects, and I believe in future a more thorough system will be adopted for their destruction." In using Paris green for spraying, an equal quantity of fresh lime should always be added, particularly upon plums and peaches.

The following interesting letter refers also to the same insect:—"Burlington, Ont.—My pear orchard consists of about 1,300 trees, more than half of which are Bartletts. These suffered particularly last season from a dark-coloured slug which ate the substance of the leaf, leaving only the skeleton. The work was done very quickly. After an absence of a few days from the orchard, I found this one variety brown from end to end of the row, Clapp's Favourite, Boussock and Anjou, alongside and mixed with them, being comparatively uninjured. I have 500 dwarf Duchess pears. These were injured next in extent to the Bartletts."—W. F. W. FISHER.

The pear slug is not a difficult insect to control. Spraying with a weak solution of Paris green or dusting with freshly slaked lime or Paris green diluted with 50 times its weight of some dry powder, are always effective.

THE GRAY PEACH WEEVIL (*Anametis grisea*, Horn) has been again reported this year as a troublesome peach pest. I referred to it in my last report as having injured apple trees in the orchard of Major R. F. Rogers at Grafton, Ont. This year, I am glad to learn that it has given no trouble in that orchard. It has appeared at Queenston, Ont., in the orchard of Mr. C. E. Fisher, but has done very little damage. The following record, however, which was brought to my notice by Mr. L. Woolverton, is of a more serious nature:

"Fenwick, Ont., April 25.—I write to you in the hope that you may be able to suggest a remedy for this beetle, which has proved very destructive to my young peach trees. Last year we tried picking the insects, but notwithstanding our efforts, they killed many of my trees, and are beginning this year again. The trees are just from the nursery, so there is almost nothing to spray. The beetles eat the young bud as soon as it appears, till they finally kill the tree. They seem to prefer the peach but also attack the pear and plum."

"May 21.—I send you some of the beetles you ask for. It has not been very suitable weather for finding them, as they come out best on warm sunny days. They are not as troublesome in my orchard this year as last, but seem to have gone to other orchards. Last year, they killed 130 young peach trees for me, and ate out four rows of strawberries extending across a six-acre field. They only attack the very first leaf buds and the bark of the young trees when first set out, or when a young tree is budded and cut off near the ground; then by eating the bud they destroy the tree. In many of their habits they resemble the potato beetle, such as dropping to the ground and

lying apparently dead. On warm sunny days they move about and eat, and on cold or wet days, they lie concealed at the root of the tree in the earth.”—E. S. ATKINS.

These beetles being wingless, they can only reach the buds of the trees by climbing up the stems; therefore, any mechanical means of preventing this, such as a band of cotton batting, or one of the many kinds of “tree protectors,” placed around the trunks at the time the mature beetles appear in April and May, would be a sufficient remedy.

THE PEAR LEAF BLISTER (*Phytoptus* (*Typhlodromus*) *pyri*, Sheuten).—This troublesome pest of the pear is becoming much more widespread in Canada. Specimens have been sent in from several localities in the east as well as from British Columbia. Mr. L. Woolverton says:—“The Pear leaf Blister mite is gaining ground on the pear trees in this district, and, so far as I know, growers have done nothing to check it. Some trees have their leaves full of it.” Among several communications from British Columbia, I received one from Mr. T. A. Sharpe, giving an excellent description of the appearance of the injury:

“Agassiz, B. C., July 6.—I send pear leaves which appear to be affected with reddish brown spots on under side, but showing very plainly on the surface. Under the microscope, the under side of the leaf is burrowed and raised into hummocks with craters or openings on the crest. A small insect, not visible to the naked eye, appears to be more or less plentiful on the leaves. Are these insects the cause or are they a secondary injury coming on after the fungus sets in? In any case, what is the remedy?”

Mr. Sharpe then gives an account of several experiments he tried with various mixtures to find a remedy. During the season he has studied this attack with care and has found in the galls another mite (a *Tyroglyphus*) which moves much more quickly than the *Phytoptus*; but he has not yet been able to detect whether or not it is predaceous on the blister mites. The remedy for this pest which has given the best results, is spraying the trees early in spring with Kerosene emulsion.

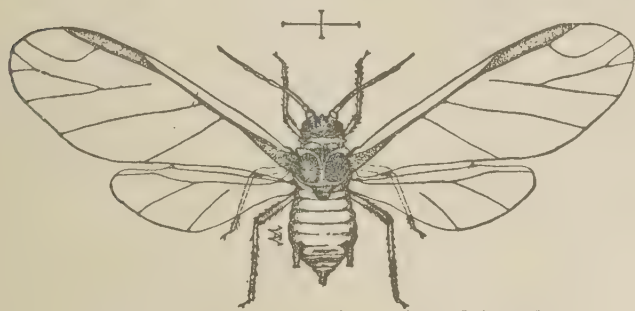


Fig. 9.—Apple Aphis: winged female.

THE APPLE APHIS (*Aphis mali*, Fab., Fig. 9) Attack: Green plant-lice clustered, sometimes in enormous numbers, around the outside and in between the young leaves of the opening buds on apple trees in spring; also on the young shoots in summer and beneath the leaves in autumn. The small black shining eggs are laid in autumn on the branches of apple trees, and do not hatch until the following spring.

The Apple Aphis or green fly is a common insect wherever the apple is grown, and although frequently very abundant, it is seldom that its injuries to its host are of a

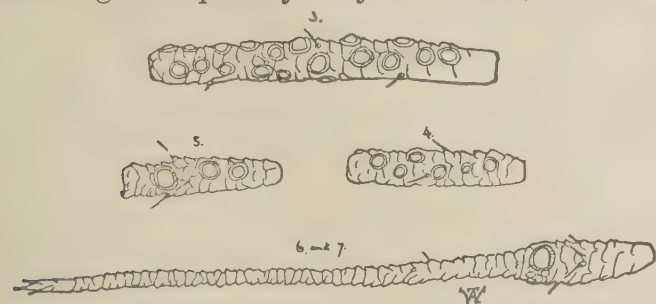


Fig. 10. Joints of antenna of Apple Aphis winged female.

serious nature in this part of Canada. From British Columbia, however, there have been received during the past three or four years many complaints of great losses from this pest,—particularly since the publication of the excellent reports of Mr. J. R. Anderson, the energetic statistician of the Provincial Department of Agriculture, have shown the fruit growers of that province that useful information

can, on application, be obtained as to the best means of fighting their insect foes. From late correspondence with some of the leading fruit growers, it has occurred to me that part of the damage to apple trees complained of under the name of “aphis,” “green fly,” &c., may have been due to other insects. That the climate of British Columbia is particularly well suited to the development of many species of plant-lice, however, is undoubtedly the case, as I observed in the summer of 1883 and during the spring of 1885, and it is important that as soon as possible the different species should

be studied critically and their life histories worked out, so that the most suitable remedies for those which injure crops may be made known and applied at the proper time. As a contribution towards this knowledge, I am pleased to be able to present herewith careful enlarged drawings of the Apple Aphis (*A. mali*) and of the joints 3, 4, 5, 6 and 7 of its antenna (Fig. 10), made by my esteemed correspondent, Prof. H. T. Williams, of the South Dakota Agricultural College, who has made a special study of the Aphididæ. This, I believe, will be of great assistance to British Columbian fruit-growers in identifying the species.

It is not only in its attack on the apple tree that the Apple aphis levies toll from the farmer, for it is now known to be a serious enemy of fall wheat.

Prof. Riley in his report, as United States Entomologist for 1889 (p. 351), when treating of the Grain Aphis, says: "Observations are complicated by the fact that several other species of plant-lice are found in greater or less numbers upon wheat. The common Apple plant-louse (*Aphis mali*, L.) is often found on wheat after the appearance of the winged generation upon apple, and, indeed it is a question whether this species, in view of what we know of its summer migration, should really be known as the Apple plant-louse, any more than the Hop plant-louse should be called the Plum plant-louse."

Again Prof. F. M. Webster, of Ohio, in a paper on the "Insect Foes of American Cereal grains (*Insect Life*, vol. VI., p. 152), writes:—

"It would appear almost visionary to advocate spraying apple orchards in mid-winter to protect the wheat crop; but nevertheless one of the most serious enemies of young fall wheat passes its egg stage on the twigs of the apple during the winter season. I refer to the Apple leaf-louse (*A. mali*, Fab.). Soon after the young wheat plants appear in the fall, the winged viviparous females of this species flock to the fields and, on these, give birth to their young, which at once make their way to the roots, where they continue reproduction, sapping the life from the young plants. On very fertile soils, this extraction of the sap from the roots has no very serious effect; but, where the soil is not rich, and especially if the weather is dry, this constant drain of vitality soon begins to tell on the plants. Though they are seldom killed outright, these infested plants cease to grow, and later take on a sickly look, and not until the aphis abandons them in autumn to return to the apple, do they show any amount of vigour."

In my last report, I referred to the complaints from British Columbia that many trees had been killed by the Apple Aphis. Commenting on this, Mr. E. Hutcherson, of Ladners, B.C., a good observer, and moreover one who knows well most of the injurious insects of his province, writes as follows:—"I compared aphids I sent you (true *Siphonophora avenæ*.—J. F.) with those on apple and found them different. As regards the Apple aphis killing trees in this province, I do not know, I am sure, where you got your information; but I have failed to find a case in my experience, and I can assure you that it is not actually the case; they may have assisted the Bark blight and Woolly Aphis to some extent, as I have found that weak, poor growing varieties and those suffering from other diseases, are the trees most affected. My experience, in my own orchard, has been that a tree affected this year is almost sure to be free the following season. I cannot say that we have been troubled much with the Apple Aphis for the last two years. We have had rains and wet weather in the spring and early summer, and again early in September; for this reason, the aphids have not been so plentiful as formerly. In this matter I speak not only for my own district, but for the whole province, up to the end of 1893."

And in another letter Mr. Hutcherson reverts to the same subject:—"In speaking of the trees being killed by the Apple Aphis in the Okanagan country, I would say that in some of the orchards there I found trees badly affected with Scurfy Bark-louse, which with the aid of the green aphis had killed quite a few trees." With regard to the correct identification of the Scurfy Bark-louse in the above quotation, I have some doubts; but when I wrote for specimens to the owner of the orchard, I found that the trees had all been cut down and destroyed.

Remedy.—The most satisfactory remedy for the Apple Aphis I have found to be the Kerosene emulsion, which should be sprayed on the trees early in spring, just as the

buds are opening. As many eggs are frequently laid on the trunks, these latter should also be sprayed.

The Apple Aphis very much resembles superficially the Grain Aphis, and, as both occur together on fall wheat, I have asked Prof. Williams to prepare for me a simple table of the chief points by which they may be separated. He has very kindly sent me the following, which will answer all purposes:—

“*Aphis mali*.

1. Antennæ shorter than body.
2. Antennæ on very slight frontal tubercles.
3. Head pointed in front.
4. Eyes black.
5. Prothorax with lateral tubercles.
6. Head and thorax black.
7. Honey tubes not broadened at base.

Siphonophora avenæ.

1. Antennæ as long or longer than body.
2. Antennæ borne on distinct frontal tubercles, which are approximate at base and of moderate size.
3. Head not pointed in front.
4. Eyes reddish.
5. Prothorax with no lateral tubercles.
6. Head and thorax brown.
7. Honey tubes broadened at base.

“There are, of course, other differences both generic and specific, such as the closely built body and shorter legs and honey tubes of *Aphis*, and more elongated body, longer and larger honey tubes and style of *Siphonophora*, as well as differences in wing characters; but those given above will, I think, serve to separate the insects readily.”

THE CIGAR CASE-BEARER OF THE APPLE.

(*Coleophora Fletcherella*, Fernald.)

Attack.—Small orange-coloured caterpillars with black heads and dark feet, encased in brown leathery cigar-shaped cases which they carry about with them. They attack the leaves of apple, pear and plum trees, by eating a small hole through the epidermis, and then feeding on the parenchyma or soft substance of the leaf, which lies between the upper and lower surfaces, protruding their bodies a long way out of the cases, and eating for some distance around the central hole. When they have consumed all they can reach, they move to a fresh place and make another hole. The brown case is very tough and at the upper end is contracted abruptly into a three-limbed star-shaped orifice, the lips of which fit closely together. Through this hole the excrement is ejected and ultimately the moth makes its exit. The larvæ and the slender dark brown chrysalids are about four millimetres in length; the case is six millimetres. There is only one brood in the season. The small shining steel-gray moths appear at the end of July and the beginning of August, and lay eggs from which the caterpillars hatch the same season and make about one fourth of their growth before winter sets in.

The young larvæ hatch about a fortnight after the eggs are laid, and, burrowing into the leaf, feed upon the cellular portion for a short time. They then cut clean holes through the leaves by taking oval-shaped pieces of the epidermis from both surfaces of the leaf above and below, and with these they form their curious cases by joining them along the edges. The two surfaces of the leaves are easily recognizable on the cases, from the pubescence of that side which was taken from the lower surface. The cases made by the larvæ in the autumn are quite different in shape from those of the full-grown larvæ which are found on the leaves in June. The autumn cases in which the winter is passed, are curved or elongated kidney-shaped, with a narrow wing in the curve. These are retained for a short time in spring, and are enlarged by the addition of small pieces of epidermis attached to the orifice. Occasionally, a larva leaves an old case on reviving in spring, and forms a new one at once; but, as a rule, the old case is detached from its winter resting place, and used for some time.

The summer cases are cylindrical, tapering slightly to the ends, in fact, very much like a miniature cigar in shape.

The following is Professor Fernald's technical description of the insect, which appears in the *Canadian Entomologist*, 1892, page 122 :—

"*Coleophora fletcherella*, Fernald.—Expanse of wing from 10 to 12 mm. ; head, palpi and basal joints of the antennæ, yellowish steel gray ; body, legs and wings above and beneath, plain steel gray, much more intense in fresh specimens.

"The palpi are without tufts, the basal joints of the antennæ with a slight tuft, and the remaining joints of the antennæ and also the joints of the tarsi are steel gray annulated with white.

"The cases are brown, composed of a portion of leaf, cylindrical or fusiform, slightly compressed laterally, and with a more or less distinct ridge above and beneath. The mouth is more or less oblique, with the edge flaring out slightly. One side of the case is covered with fine hairs the other is smooth, showing that the larva constructs its case from the upper and under sides of the leaf.

"Described from three specimens received from Mr. James Fletcher, for whom I name the species, and who bred it from apple. I have also received the same species from Prof. Lintner, who also bred it from apple."

This insect has been treated of in previous reports of this department (1891, pages 196-198 ; and 1892, page 146).

During the past summer this small but destructive enemy of the apple has been reported to me as injuriously abundant in Ontario, at Oshawa, Maitland and Grimsby, and in *Canadian Horticulturist*, 1894, page 302, without locality, in Ontario ; and in Nova Scotia, at Lakeville and Woodville. It has also been noticed in small numbers at several places in Ontario, Quebec and the Maritime Provinces. It has shown itself to be very difficult to treat ; but it is probable, from Dr. Young's experience cited below with other correspondence, that spraying with Kerosene emulsion and Paris green early in spring is an effective remedy if persevered in.

The following extracts from some of the letters received will be found instructive and useful :—

"Oshawa, Ont., March 30.—Inclosed you will find two small apple twigs. What is on them ? Will you write me and let me know how to destroy them ? I have about forty acres of apple orchard and these things are getting very numerous, as you can see by the twigs. As quick as the bud opens in the spring, they crawl out on the young leaves, and, when full grown, are about as big as a kernel of rye."

"April 19.—I am glad to know the name of the little pest that is injuring my apple trees, for I think they are hurting the trees considerably. I first noticed them two years ago. They were not so bad as they were last year, taking the orchard all through.

"I sprayed a part of the orchard two years ago with Paris green, $\frac{1}{4}$ ounces ; sulphate of copper, 4 pounds ; lime, 4 pounds ; water, 50 gallons. I sprayed for the Codling Moth and Black Spot on apple when the apples were about as big as small cherries. Last year, I sprayed all the orchard but about five acres. The trees on these five acres are about twelve years old, about half Northern Spys and Ribston Pippins. The Ribstons are very bad ; the insects are about fifty on the unsprayed trees to one where I sprayed ; but the Northern Spys are not much worse than where I sprayed. How much they are hurting the trees, I cannot tell,—if I went by the fruit, I would say a good deal. Two years ago, I had 1,800 barrels of packing apples ; last year, 375 barrels ; but I am in hopes the Paris green is going to keep them in check."

"June 14.—I now write you my further experience with the Cigar Case-bearer. I sprayed as you recommended as soon as I could. I started on May 7th and sprayed for four days, a part of the orchard with dilute Bordeaux mixture and a part with Paris green alone. I cannot see any difference. I seem to have killed about half or two-thirds of the insects. I believe I should have killed more, but the wind was blowing very hard when I sprayed, and the next week that big rainstorm came. I intended to write before, but was waiting to be sure of the effects of the spraying. The dead caterpillars still stick on the trees ; but the live ones have grown away from the dead ones, so we can tell them now. I am going to spray again in a few days. I thank you very much for the trouble you have taken. When I wrote you first, on the 19th April, I was about discouraged. I did not think the Paris green would kill them. In previous

years I did not spray until about the 20th June ; the insects were then full grown, and I did not know when I had killed them, for they still stuck on the trees.”—EDWIN WORDEN.

Fearing that Mr. Worden might have been deceived by the inactivity of the larvæ owing to some of them having completed their growth and fastened their cases to the leaves in order to pupate, I wrote to him again, asking him to send me some of the leaves bearing the larvæ which were supposed to be killed. These specimens were sent forward by Mr. Worden on June 19th, when he wrote:—

“I inclose you the leaves as directed by you. The little pest is hard to conquer. I am spraying again now. If these insects would leave my trees alone, I am satisfied I should have a good crop of apples, but they are even eating the little apples now.”

Upon examining the specimens carefully, it was found that only 17 per cent of the larvæ were dead, which was a disappointment, as it indicated that Paris green as a remedy was only partially successful. Mr. Worden was then requested to spray some of his trees with Kerosene emulsion. His answer was as follows:—

“July 5.—Inclosed you will find some leaves sprayed with Kerosene emulsion about ten days ago. It does not seem to do much good. I am about discouraged. These little insects seem to be getting worse all the time. Will you write and let me know about how long these insects troubled them in Prince Edward Island? If they are the same you mentioned in your report for 1891, I notice you say they were on plum and pear trees. Now, I have plum and pear trees side by side with the apple trees, and I never saw one on a plum or pear leaf. How would you think it would answer to have torches burning here and there through the orchard about the first of August? I noticed last year about the first of August, if the door or window was open after the lights were lit, the room would be full of little moths. Please write and give me your opinion of the torches and how far apart to have them in the orchard. I am willing to try anything you suggest to get rid of these insects, for I am satisfied the orchard will not do anything while they are on the trees.”

Reply:—“July 20.—I was absent from Ottawa when your letter arrived and have just returned. By this time the case-bearers will have stopped their work upon your apple trees. Dr. Young, of Aldolphustown, who suffered very severely a year or two ago from this same pest, treated it very successfully with Paris green and Kerosene emulsion. My correspondent, the late Mr. Wm. Brown, of Charlottetown, Prince Edward Island, only had this pest on his trees two years ; his attack was upon plum trees. As you have noted, it is a very remarkable thing how the same insect will attack one kind of plant in one district and another somewhere else. An analogous instance is the ‘Shot-borer’ beetle of Nova Scotia, which there attacks the apple tree almost exclusively ; while in England the only reported attack by it, is on plum, and, at the same time, the first attack noticed by this insect was upon pear trees, hence one of its names—the Pear-blight beetle.

“It is just possible that your suggestion of carrying torches through the orchard when the moths appear may be a valuable one, and I shall be very much obliged if you will try it. The moths are just appearing from the caterpillars which you sent me early in the season, so that now would be the proper time to test this remedy. A convenient way of destroying them in large numbers, if you find that they are attracted by the light, will be to place in the orchard a lantern or lamp in a basin of water, having first sprinkled a little coal oil on the top of the water. The moths flying to the light will fall into the water and be destroyed by the film of coal oil which floats on the surface. I shall be much obliged if you will try this remedy and let me know how it succeeds.”

From the following reply, it will be seen that the use of a light at night to attract the moths was not very successful:—“I tried the torch light on a small scale. I had to cross the road from my house to the orchard, and, strange to say, while on the road, the moths would come very thick ; but when I got in the orchard, I did not catch so many all night by leaving the torch burning, as I did during the few minutes outside. I think I destroyed about half of the case bearers with the treatment last summer. Next year I am going to try the Kerosene emulsion, but would like to spray a little later than the time you suggest so as to catch the bark louse as well.”—EDWIN WORDEN.

Careful investigations were also made on this insect at Maitland, Ont., by Mr. Harold Jones, who has kindly supplied me with much valuable definite information on its life history. Mr. Jones called upon me on August 24th, and spoke of the case-bearer as having been very abundant in his orchard this year. He first noticed it early in the spring, attacking the buds and the stems of the flowers and leaves. He sprayed at once before the flowers opened. Directly the flowers dropped, he sprayed again with Bordeaux mixture and thinks that 25 per cent of the larvæ were destroyed. He sprayed a third time about three weeks later when the apples were about as large as a pigeon's egg. He observed that, about the third week in June, the larvæ ceased feeding and went to the upper surface of the leaves to pupate. On September, Mr. Jones sent me a supply of the young larvæ with the following letter:—

"Maitland, Ont., September 1.—Referring to our conversation of a week ago, I send you by this mail twigs of apple, with the case-bearers attached. You will note that, whereas three weeks ago the young caterpillars were on the underside of the leaves, now you will find them clustered about the buds, attached to the bark of the present year's growth in every case. They are now about double the size they were on the 10th August when I first observed them. I picked out the worst affected twigs that I could find, for I thought you would be glad to note their habit of clustering."

Later Mr. Jones sent the following interesting résumé of his observations:—

"November 6.—Referring to our conversation of August last and our correspondence during the early part of September, relating to the actions and life of the Cigar-shaped Case-bearer; I now give you the result of my observations during the season, hoping that there may be some point that may aid you in finding the best time of the season to most effectually destroy this serious pest to our apple orchards.

"During the early part of May, just as the buds were opening, I sprayed my trees with Bordeaux mixture; and a short time after, when the blossoms opened, I noticed that the half-opened leaves and flowers withered and died. I had no idea of the cause at first, but on examination, I found large numbers of a strange insect (since known as the Case-bearer), had punctured the stems of the leaves and flowers and were working so rapidly that, when the blossoms fell and I was able to spray again, some of the trees had very little set fruit left.

"This second spraying was done with Bordeaux mixture and Paris green in the proportion of one pound to 200 galls. of mixture. The results of this application were hard to determine, but I noticed that all further attacks on the young fruit were stopped and the caterpillars were working on the underside of the leaf, whereas before they worked on both sides.

"I think I am safe in estimating 20 or 25 per cent destroyed. I sprayed again with the same mixture and Paris green added, about two weeks afterwards when the apples were about the size of the top of my thumb or larger, this making three applications in all. The last application did not affect them perceptibly, as at that time they had permanently attached themselves to the leaf to go into the pupal state.

"About the 10th of August I first noticed the young brood feeding, they were then so small as to be hardly noticeable, and were less numerous, there being only about one-fifth of their numbers in the spring. During the next 20 or 25 days, they fed and grew to a length of about $\frac{1}{16}$ of an inch or more. At that time, the first week in September, the weather turned quite cool and they left the leaves and clustered in rings about the base of the present year's wood growth.

"From that date until the middle of October, they could be found either on the leaf feeding, or attached to the twig according as the weather was warm or cold. After the middle of October, they left the foliage and twigs and are now attached to the larger parts of the tree, in some cases down on the trunk, but mostly on the under side of the branches at their junction with the trunk or larger branches, and I also find clusters of them in the shelter formed by a partly healed wound where a limb has been severed.

"This winter during the most severe weather, I intend taking a stiff brush and brushing some of the trees in all the crotches and larger branches and letting the insects fall on the snow, where I am in hopes they will perish.

"If my theory, that frost and snow will destroy these insects, prove correct, I can quickly and easily remove one-half to three-fourths of the entire brood now lodged on trees eight or ten years of age, and diminish their numbers on larger trees."—HAROLD JONES.

"Lakeville, N. S., June 8.—I inclose to you to-day some specimens of insect pests for examination. The insect attacks the young buds and leaves, destroying the foliage as soon as it appears. The Baldwin, Tompkins, Twenty-ounce Pippin, Talman Sweet and Rhode Island Greening, were attacked and the young leaves almost entirely destroyed, while the Bishop Pippin (Yellow Belle flower) tree was almost entirely free from the pest. I sprayed before blooming with Paris green 4 ounces, lime 3 lbs., water 45 gallons. I could not see that any insects were killed, being just as numerous after spraying. Any information you can give me about destroying this insect, will be thankfully received."

"June 20.—I send you specimens of the insects that have been doing very much damage to fruit trees in this locality this spring. They began their work of destruction about 1st May, when a few were seen to crawl from the angles of the small branches and attach themselves to the leaves just beginning to form. They would move along the branches, the head protruding from the sack or cigar-shaped case. About May 10th I sprayed the trees from which these specimens were taken on June 20th, with Paris green 1 lb., lime 4 lbs., water 160 gallons. At that time only a few were on the foliage. The greater part of the pests were still to be found in the angles of the small branches and rough places of the bark. The application of this mixture destroyed very few, if any. To-day, June 20th, I notice some time after full bloom the blossoms withering and dropping from the tree at the slightest jar from the hand, and the foliage of the tree having the appearance of being riddled with small shot and scorched by heat. On these trees no fruit is forming, although the blossoms looked healthy."—R. A. BECKWITH.

At the end of the season, Mr. Beckwith reported as follows:—"I did not spray as you advised. By July 1, nearly, or quite all of the insects had disappeared, the trees soon after having a healthy appearance. A few orchards only were damaged by this insect in this section of the valley." (Lakeville is in the Annapolis Valley, so celebrated for its fruit.) "Those orchards in which the case-bearer appeared were badly damaged, the crop a total failure."

"Woodville, N. S., March 28.—I send you to-day some apple limbs. You will find on them small insects which have done a great deal of damage in this county. Please explain their habits and send a remedy."

"April 18.—Thanks for information. I am sending you more specimens to-day out of the same orchard.

"These insects destroy the buds, as you see by specimens; destroying the buds injures the crop, as new buds have to start. The insects are now commencing to crawl on to the buds, destroying first the buds, then the blossoms, if any are left, and leaves; so you see something must be done before the trees blossom. They seem to work on some varieties more than on others. The variety sent is Nonpareil. The trees look, at the end of June and in July, when the trees are leafing out and blossoming, as if they had been scorched by fire.

"We consider this little caterpillar the worst enemy to our fruit crop. Please advise me what to do, as the remedy must be applied at once."—G. W. F. McLEAN.

Remedies.—As a remedy we at first recommended spraying with Kerosene emulsion during the winter, to destroy the hibernating larvæ, but it appeared to have no effect. Twigs from sprayed trees were sent to me in winter by Dr. Young, which, a fortnight after spraying, still retained strongly the odour of Kerosene (coal oil); when revived by the warmth of my office, the larvæ crawled about uninjured, and Dr. Young reported that these trees treated in winter showed no benefit from the spraying.

Spraying with Kerosene emulsion and Paris green at the time when the buds are opening, has given the best results, as will be seen from the following letters:—

"Adolphustown, Ont., June 26.—On the large block of Duchess apple trees, where we sprayed in 1891 and 1892, where the said worms were so numerous, there is only an odd worm to be seen. But in other parts of the orchard, where they had scarcely

reached at first, they were numerous this spring. We sprayed them with Paris green, but on account of weather, and my brother's illness, the spraying was not complete, nor as effective as one would wish.

"July 3.—The Kerosene emulsion, either warm or cold, used in the winter, had no effect. But when used cold in the spring, after the worms began to move about, was very effectual. It more completely cleaned the trees of the Case-bearers than did the Paris green. Still the Paris green did well and took most of them off. We sprayed with both the same day. We sprayed the next year again with Paris green, and this year again, but this year there were very few indeed in that part of the orchard."—DR. D. YOUNG.

From the above it would appear that, owing to the fact that the caterpillars for the most part feed beneath the leaves and eat very little of the outer surface, Paris green, although effective in a certain measure, is not a satisfactory means of controlling the Cigar Case-bearer. The best remedy in our experience so far, is Kerosene emulsion applied as a spray when the young larvæ are active, particularly early in spring.

THE SAN JOSE SCALE.

(*Aspidiotus perniciosus*, Comstock.)

Few insects which attack fruit trees are with more reason dreaded by the horticulturist than the San José or Pernicious Scale of the Pacific Coast. On two or three occasions it has been reported to me as occurring in British Columbia; but I had at first the impression that the insect referred to was the Scurfy Bark-louse (*Chionaspis furfurus*, Fitch), or something else. During the past summer, however, undoubted specimens of *Aspidiotus perniciosus* on apple have been received from British Columbia and have been identified by Mr. L. O. Howard. From recent correspondence, I believe it is probable that, at any rate, some of the serious injury to the apple trees in British Columbia which has been reported as due to the Apple Aphis is in reality caused by this and other scale insects. The fact that one is a plant-louse with well developed organs of locomotion at all stages after hatching, and the other a scale insect, which has the power to move for only two or three days, does not affect this supposition; for, unfortunately, there is even yet a most deplorable ignorance and indifference as to the right names of the worst insect enemies of the farmer and fruit-grower. So that the referring a pest even to the right natural order is the exception rather than the rule, "bugs," "flies," "weevils," "grubs" and "worms" being accused indiscriminately of injuries caused by quite different insects. Not only does this cause loss of time, because, in many instances, specimens have to be written for; but in those cases where cultivators undertake to doctor their crops themselves, the wrong remedy is often applied, of course, to their great disappointment at obtaining no beneficial results. In all cases, whenever possible, specimens should be sent with letters of inquiry.

Knowing the great danger which would result from the failure on the part of Canadian fruit-growers to recognize and use every effort to eradicate so pernicious a foe as the San José Scale, as soon as it was known for certain that specimens had occurred in Canada, I prepared for *The Farmer's Advocate*, of London, Ont., which has a wide circulation, and for the *Annual Report of the Entomological Society of Ontario*, an article giving the life history and the remedies which had been found most effective against this pest. These were drawn for the most part from the records of the warfare waged by the United States Division of Entomology, which have been kindly supplied to me by Mr. L. O. Howard, who has also been good enough to lend me the four figures used to illustrate this article.

I reproduce herewith extracts from these articles so as to bring the proper treatment to the knowledge and attention of as many as possible.

This insect has had attention drawn to it of late by its unexpected appearance in injurious numbers in the Eastern States during the summer of 1893, and the Division of Entomology at Washington, under the direction of the United States Entomologist, Mr. L. O. Howard, has, during the past summer, adopted such vigorous measures to combat it, that there is reason to hope that in all the localities from which it has been reported, the insect has either been eradicated or brought under control.

Up to 1892, the San José Scale was thought to be confined in North America to the Pacific States, where it has shown itself to be a most destructive enemy of the fruit grower. It was probably first brought to California on fruit trees imported from Chili about 1870, and the name, San José Scale, was given to it by fruit shippers in 1873, from the name of the place in California where it was first noticed. It spread rapidly for seven years without any particular attention being paid to it. In 1880, however, Prof. Comstock pointed out the great loss which it was causing, and gave it the specific name *perniciosus*, for the reason that he considered it to be the most pernicious scale insect known in the country. It not only swarmed in countless numbers on fruit trees in certain orchards, but infested nearly all kinds of deciduous fruit trees grown in California. In a special circular which Mr. Howard issued last year, when the insect appeared in the States of Virginia and Maryland, he says as follows: "In the course of twelve years, the insect spread through all the fruit-growing regions of California, through Oregon and into the State of Washington."

It is known as the worst insect pest of deciduous fruit trees on the Pacific coast, and has caused great pecuniary loss. Many crops of fruit have been ruined, and thousands of trees have been killed. (L. O. Howard, *Circular No. 3*.)

In 1892 the insect was found in New Mexico on apple, pear, plum, peach, quince and rose. It had been brought into New Mexico upon young trees from California. Nearly all the other instances of infestation east of the Rocky Mountains can be traced to two nurseries in New Jersey, where the pest had been introduced in 1886 or 1887 on trees of the Japanese plum "Kelsey," which had been procured from the San José district in California. Idaho pear trees had also been frequently imported from California, which were most probably infested. In 1891 and 1892 several blocks of young apple trees were badly infested. It is on pear trees chiefly that this pernicious scale has been distributed through the State of New Jersey. Prof. J. B. Smith says (*Insect Life*, VII., p. 166):—"The Idaho pear has been the most dangerous because it came infested whenever imported direct, and after it, came in close order, Madame von Siebold, Garber, Lawson, Seckel, Lawrence and Bartlett. Other varieties are also infested, but less frequently, and the scales do not do so well. Kieffers alone are absolutely exempt, and closely following comes the Leconte, which is rarely infested in the nursery, and never in the orchard, in my experience. One tree grafted with Lawson and Kieffer had the Lawson branch and fruit covered with scales, while the Kieffer branch was entirely free. Currants, black and red, became rapidly infested and the scales were certainly distributed on these plants."



Fig. 11.—San José Scale: c, adult female containing young, greatly enlarged; d, anal fringe of same, still more enlarged.

Mr. Howard says that this insect spreads rapidly for a scale insect, and is the most dangerous scale known. It is, too, inconspicuous and would be overlooked by many. Specimens of apple boughs received from British Columbia were entirely incrustated with the scales, so as to give them the appearance of having been dusted with ashes. Mr. Howard gives the following description of the scale in his circular above referred to: "The San José Scale belongs to the same group of scale insects, the Diaspinæ or armoured scales, to which the Oyster-shell Bark-louse of the Apple belongs. It differs from this species, and in fact from all other eastern species found on deciduous fruit trees, in that the scale is perfectly round, or, at most, very slightly elongated or irregular. (Fig. 11). It is flat, pressed close to the bark, resembles the bark of the twigs in colour, and when fully grown is between $\frac{1}{16}$ and $\frac{1}{8}$ of an inch in diameter. At or near the middle of each scale is a small, round, slightly elongated black point; or this point may sometimes appear yellowish. When occur-

ring upon the bark of the twigs or leaves and in large numbers, the scales lie close to each other, frequently overlapping, and are at such times difficult to distinguish without a magnifying glass. The general appearance which they present is of a grayish, very slightly roughened scurfy deposit." (Fig. 12.)

The natural rich reddish colour of the limbs of the peach and apple is quite obscured when these trees are thickly infested, and they have then every appearance of being coated with lime or ashes. When the scales are crushed by scraping, a yellowish oily liquid will appear, resulting from the crushing of the soft yellow insects beneath the scales, and this will at once indicate to one who is not familiar with their appearance, the existence of healthy, living scales on the trees. During winter the insect is to be found in the half grown, or nearly full grown condition. The young begin to hatch and to crawl from under the female scales shortly after the trees leaf out, and from this time through the summer there is a constant succession of generations. The insect affects not only the young twigs and limbs and, with young trees, the entire plant, but is also found upon the leaves and upon the fruit. When it is abundant, the fruit is destroyed. One of the most characteristic points in the appearance of the insect upon fruit is the purple discoloration around the edge of each scale.



Fig. 12.—San José Scale : Apple branch with scales ; large scales above at left.

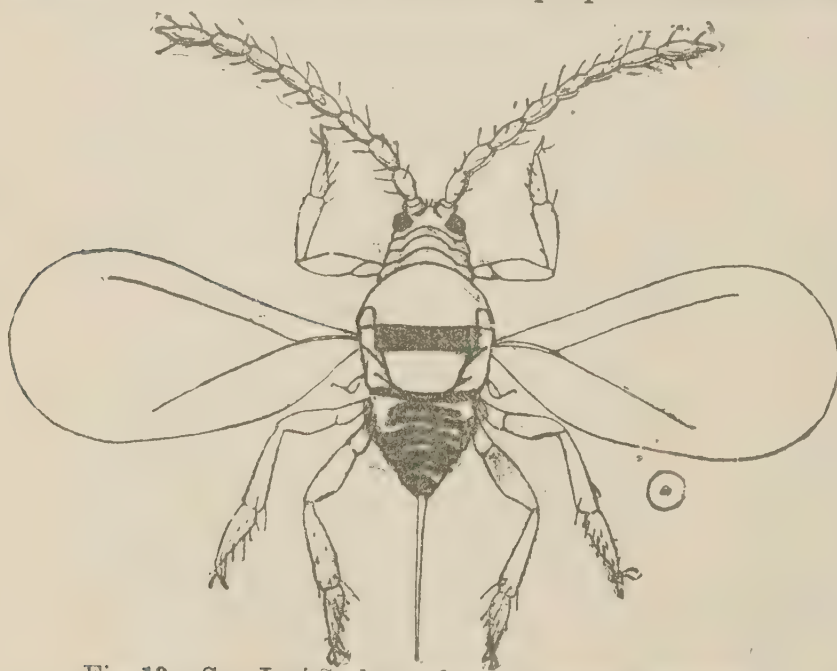


Fig. 13.—San José Scale : male adult, greatly enlarged.

Fig. 14 shows a pear attacked by the scale and a separate scale much enlarged. The male is an active minute insect. (Fig. 13).

The above description and figures will enable fruit-growers to recognize this enemy should they be unfortunate enough to get their orchards infested with it. With regard to remedies, we have the advantage of all the experience of Californian experimenters, the careful work of the Division of Entomology at Washington, and of Prof. J. B. Smith, of New Jersey, during the past year. There are three methods which have proved effective

in fighting the San José Scale. In cases of severe attack, it is recommended to cut down the infested trees and burn them. The other methods are: Spraying with insecticidal washes or fumigating the trees with poisonous gasses. The insecticidal washes may be divided into summer washes, which can be applied while the trees are in leaf, and winter washes of a stronger nature which would injure the foliage, but will do no harm to the trees during the winter when these are in a dormant condition, and yet will have the effect of destroying the scale insect. Of the *summer washes*, the ordinary Kerosene emulsion (Riley-Hubbard formula) and a Resin wash [Resin 20 lbs., caustic soda (70 per cent strength) 5 lbs., fish oil 3 pints, water 100 gallons], were recommended by Mr. Howard, and used with success during the past summer. On peach trees, owing to the susceptibility of the foliage to injury, the stock emulsion was diluted with fifteen times its volume of water, instead of nine times, the usual strength advised

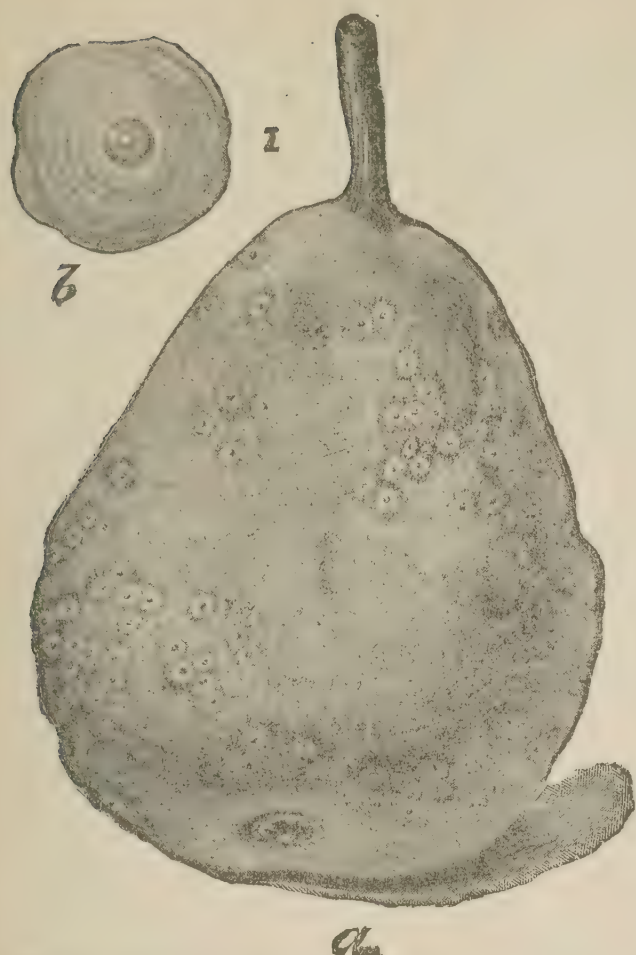


Fig. 14.—San José Scale; *a*, pear moderately infested; *b*, female scale enlarged.

for most other plants. It was found advisable to repeat the sprayings at intervals of about a week. The young scale insects were noticed on May 19th at Riverside, Ind., and the females, viviparous in habit, gave birth to young for a full month. This was upon peach trees, and it was found that the Resin wash killed the scales more quickly than the very much diluted Kerosene emulsion. As Mr. Howard points out, this rapidity of the work is important, since where a full grown female is sprayed with Kerosene emulsion, she may live for three or four days, during which time she brings forth young; whereas if sprayed with Resin wash, fewer young scales are produced. The resin wash, however, is readily carried off by the rains, while the Kerosene emulsion is more resistant.

In Prof. J. B. Smith's investigations in Pennsylvania, it is recorded in *Insect Life* (VII., p. 159) that "he has visited the locality at Atglen, Pa., and found that in an orchard of over 7,000 trees, all of certain varieties, and a few of others were infested by the scale. As a result of his recommendations, Kerosene emulsion has been applied three times to most of the trees at intervals of ten days, up to the first week in June. The treatment has been absolutely successful."

For *winter washes*, the Kerosene emulsion and Resin washes may be made stronger. The stock Kerosene emulsion has been used diluted with only $4\frac{1}{2}$ parts of water, and for the Resin wash the same ingredients were used in the following proportions: Resin, 30 lbs., caustic soda, 9 lbs., fish oil, $4\frac{1}{2}$ pints, water, 100 gallons.

"The most favoured winter remedy in California, however, is the lime, salt, and sulphur mixture. This consists of unslaked lime 10 lbs., sulphur 5 lbs., stock salt 5 lbs., water to make 15 gallons. This wash will do great damage to the trees if applied during the growing season, *and should be used only in winter*. All the sulphur and half the lime are placed in a kettle, and $8\frac{1}{2}$ gallons of water added; after which, the contents of the kettle are boiled briskly for about an hour. The solution, which at first is yellow from the sulphur, will turn very dark brown, assuming more or less of a reddish tint, and will finally change from a thick batter to a thoroughly liquid condition, the product being ordinary sulphide of lime. All the salt is added to the remaining 5 pounds of lime, and the latter slaked; after which, the slaked lime and salt are added to the sulphide of lime already obtained, the whole being then diluted with water to make 15 gallons. This should be strained before application, as it does not form a perfect liquid solution, on account of the considerable quantity of undissolved lime, which will soon sink to the bottom, unless the solution is constantly stirred while being sprayed." (L. O. Howard, *Circular No. 3*.)

The third method of fighting scale insects is known as the Gas Treatment. This has been extensively used in California, but is an expensive operation, and the materials necessary are very poisonous and dangerous to have about a house. It consists, briefly, of covering the tree to be treated with an air-tight tent, and then filling the tent with the poisonous fumes of hydrocyanic acid gas, which is generated by placing 1 oz. of cyanide of potassium, 1 fluid ounce of sulphuric acid and 3 fluid ounces of water in an earthenware vessel beneath the tent. The gas is very light and rises to the top of the tent, and if this be kept on the tree for half an hour, every scale will be destroyed. The quantities of ingredients given above are sufficient for a tent inclosing 150 cubic feet.

What is wanted, however, is to know the best remedy, and it is satisfactory to find that, on the whole, the standard remedy for scale insects, Kerosene emulsion, is the best. In summing up his experience of the year, Mr. Howard says as follows:—"Remedial work against this insect is onerous, but our experience has shown that three sprayings at intervals of ten days during the latter part of May and June, will practically destroy the insect, whether the spraying be conducted with very considerably diluted Kerosene emulsion or with a resin wash, while during the winter a single application of either of the three winter washes will greatly reduce the numbers of the insect. Among the winter washes, our experience leads us to give the preference to strong Kerosene emulsion; next, to the winter Resin wash; and finally, to the lime, salt, and sulphur mixture."

The Kerosene emulsion is now well known to most Canadian fruit growers; but it may be well to give its mode of preparation here.

Kerosene (Coal oil).....	2 gallons.
Common soap or Whale oil soap.....	$\frac{1}{2}$ pound.
Water.....	1 gallon.

Cut up the soap and boil in the water till all is dissolved; then add it boiling hot to the coal oil; churn the whole briskly for 5 minutes with a syringe or force pump. When the emulsion is perfect, it will adhere without oiliness to the surface of glass and when cooling it forms a jelly-like mass, which can be kept indefinitely, if stored in a cool place and covered from dust.

When required for use; for a summer wash, dilute 1 part of the stock made as above with 9 or 15 parts of water. To make the stock dissolve easily, take first 3 parts of hot water to one of the emulsion and then when all is thoroughly mixed, add the rest of the water to make the 9 or 15 parts required; for a winter wash, mix with $4\frac{1}{2}$ or 9 parts of water.

THE PEAR-TREE FLEA-LOUSE.

(*Psylla pyricola*, Förster, Fig. 15.)



Fig. 15.—The Pear-tree Flea-louse, enlarged.

Attack.—Small clear-winged insects, wedge shaped like miniature *Cicadae*, the head being broad, flat in front, and the body pointed behind; one tenth of an inch in length, of a reddish brown colour with broad black bands across the abdomen. These insects, at the slightest disturbance, leap from the foliage of infested pear trees and fly for a short distance. Occurring with these, will be found on the leaves the curious flattened oval larvæ (fig. 16), which, when first hatched, are very small, one-eightieth of an inch in length, of a semi-translucent yellow colour, with red eyes. These grow rapidly, and in about a month pass through five nymph stages, during which the body retains its flattened form and becomes much darker until, in the full grown nymph, the large wing-pads and the greater part of the upper surface are black. The eyes and sometimes the body between the black markings are crimson. The presence of this insect

upon trees is easily detected by the copious secretion of honey dew with which the leaves, limbs and trunks of the trees soon become covered and upon which a dirty-looking black fungus, *Fumago salicina*, develops. After a time, the leaves and young fruit fall, the trees assume an unhealthy appearance, and in the case of severe attack the tree dies.

Another enemy of fruit trees which has this year appeared for the first time in Canada, is the Pear-tree *Psylla* or Flea-louse, specimens of which were sent to me by Mr. J. S. Freeman, of Freeman, Ont., who writes:—

"Freeman, Halton Co., Ont., June 7.—I have a block of three hundred Dwarf Duchess pear trees mixed with apple trees, which are so badly infested with the insects which I am sending you, that, from the appearance



Fig. 16.—Nymph of Pear-tree Flea-louse enlarged.

of the trees at present, the whole crop, some of the worst specimens of which I am sending you, will be destroyed. I do not think the pear trees were troubled before this season. Would you kindly tell me what the insects are and give a remedy? Would it be too late to apply a remedy this season? Please reply.

Reply.—“June 8. Your letter of 7th inst., with insects inclosed, is just to hand and is of great interest. I wish you had written a little sooner in the season. The insects sent are the Pear-tree Psylla (*Psylla pyricola*), a pest which has done great injury in the States of New Jersey and New York. This is the first record of its appearance in Canada. It is a serious pest, and must be fought vigorously at once. The remedy is Coal-oil emulsion. (See page 12 of bulletin 11 sent herewith). Instead, however, of mixing the stock emulsion with nine times its quantity of water, I would suggest your using 12 times the quantity of water first, and see how that works. I shall be obliged if you will write me at once and let me know how long it is since you first noticed this pest, and if it is very prevalent in your district?

“The presence of this insect is always indicated by a sticky exudation noticeable on the twigs, called honey dew. Upon this, later in the season, a black fungous mould grows which gives the tree a very dirty and unsightly appearance. I cannot impress upon you too strongly the importance of treating this pest at once, and if possible checking its spread. Please let me know if you or any of your neighbours have recently imported trees from the States of New Jersey or New York. I shall be glad to give you any further information in my power.”—J. F.

“Freeman, June 13.—I am much obliged for the information your letter brought me on the 11th inst. I have applied the coal-oil emulsion as you recommended on my Duchess Dwarf trees, which are 12 years old, in 12 times and not 9 of water as in formula; but besides being on these, I find the insects are more or less over my other pear trees of 9 acres of different varieties. I knew from the appearance of my trees that something unusual was attacking them; but I did not make a close examination of them until two days before I wrote you. This must be the first season this pest has been bothersome, or I should have noticed the fungous growth last season if it had been there as this. From inquiry of fruit-growers in this section, I think it is likely that this pest may be found in other orchards. The original trees in my orchard came some 15 years ago from Lockport, N.Y., and I have, with many of my neighbours, planted more or less pear trees every spring since, all the trees coming from the same place, Lockport. Any more information as to destroying this pest, will be gladly received.”—J. S. FREEMAN.

Several articles have lately appeared upon the Pear-tree Flea-louse. By far the most complete study of the subject has been made by Mr. Mark V. Slingerland, of Cornell University, and the results of his labours have been published as *Bulletin 44* of the Cornell University Agricultural Station. In this a full history is given of the development and habits of the insect, illustrated by excellent figures, of which Nos. 15 and 16 have been kindly lent for this article. Winter is passed in the perfect state, the males and females hiding in crevices and beneath flakes of bark on the pear-trees. In the first warm days of spring, the date varying with the season, they emerge from their winter quarters, and after mating, “the eggs are laid in the creases of the bark or in old leaf scars, about the bases of the terminal buds of the preceding year’s growth; some were seen about the side buds near the terminal ones. * * * * *

The eggs are scarcely visible to the unaided eye. It would take eighty placed end to end to measure an inch. They are elongate, pyriform in shape, smooth and shiny, of a light orange yellow colour when first laid, becoming darker before hatching. A short stalk to the large end attaches the egg to the bark, and a long thread-like process projects from the smaller end. The temperature conditions in the spring influence not only the time of oviposition of this winter brood, but also the duration of the egg stage. The weather remaining cool, eggs upon the trees under natural conditions, did not hatch until May 10, or more than a month after oviposition began.”

The young nymphs immediately on hatching, suck the sap. Mr. Slingerland found that a few nymphs emerged in spring before the leaves had expanded; these crawled into the buds out of sight. The favourite feeding places of the nymphs to

which their flat bodies adapt them, are in the axils of the leaf petioles and of the stems of the forming fruit. After the fifth moult, the adult insects appear; they are quite different in habits from the nymphs, being extremely active and flying away at the slightest disturbance. The winter form which lays the eggs of this first brood, is larger and brighter-coloured than the summer broods, of which there are two or three.

The eggs of the summer broods are not laid "on the twigs, but on the under sides of the tenderest leaves, among the hairs near the mid rib, or on the petiole near the leaf. Sometimes the female very adroitly places an egg or two in each notch of the toothed edge of the leaf." The summer eggs hatch in eight or ten days.

Remedies.—As stated above, the Pear-tree Flea-louse hibernates in the perfect state on the trunks of the trees and begins to move about and mate early in the spring. At this time, the insects are not very active, and when it is known that trees are infested, many can be destroyed with small expense of labour and material by spraying the trees with Kerosene emulsion.

This will be more effective if the rough bark is first removed with a hoe or some similar instrument.

The treatment which is most highly recommended is to spray after most of the young nymphs have hatched. Mr. Slingerland says: "The best time to spray is early in the spring, just after the leaves have expanded. In 1892, about May the 15th, was the best time; then the first brood of nymphs had all emerged and were exposed in the axils. It was the first brood which did the most harm in 1891. Fruit growers should examine their orchards when the leaves are expanding, and, if the nymphs are numerous, the trees should be sprayed at once. A second and even a third spraying may be necessary. The destruction of the nymphs is practicable during a period of two weeks, about May the 15th. If the spraying is thoroughly done at this time, the pest will be so completely checked as to necessitate but little, if any, further attention during the season."

The Pear-tree Flea-louse belongs to the same class of insects as the Aphids or plant-lice, with which they form the second section of the *Homoptera*, known as *Dimera*, or those with two-jointed feet. In this section we find small insects with antennæ longer than the head and, in the winged individuals, four wings, ordinarily all of the same membranous texture. The Psyllidæ or flea-lice are small insects found on leaves, and some species, as the Hackberry Flea-louse, give rise to galls. They have long slender antennæ terminated by two bristles. The beak is short and tri-articulate, and the eyes are lateral and prominent as in the *Cicadæ*. In fact, these little flea-lice, although seldom much more than one line in length, very much resemble *Cicadæ* in miniature. On the front of the face are three ocelli placed in a triangle, the posterior ones quite close to the eyes. Unlike the Aphids or plant-lice, the flea-lice have the power of leaping, from which they take their English name.

THE PEACH BARK-BORER.

(*Phlæotribus liminaris*, Harris.)

Attack.—Small cylindrical beetles, one-twelfth of an inch in length, of a brownish black colour, covered with short hairs, which bore in the bark of peach trees, and, if numerous, cause the death of the trees in three or four years. The presence of these beetles is easily recognized by the conspicuous red powder, which is the borings cast out of the holes by them in their mining work, and, in the winter and spring, by enormous quantities of gum which oozes from the infested trees, thus greatly reducing their vitality.

The Peach Bark-borer, although apparently a rare insect in Canada, is a serious pest in one or two orchards in Queenston, Ont.; I have as yet received myself no authentic record of its occurrence in other districts in Canada, although it is referred to by Dr. Lintner and Mr. Slingerland as having occurred in numbers at Ringwood, Ont.

With a view of bringing out further information as to the prevalence of this pest, and also to put on record what has been done towards finding a remedy and completing its life history, I submit herewith the following correspondence:—

“Queenston, Ont., March 22, 1893.—That small beetle borer which I gave you at the St. David's meeting has been seriously affecting my peach trees. I send you a few more. Will you please tell me about its habits and how to combat it? I wish to be positive as to the non-injury of the peach tree before using any wash. Some of my neighbours claim that they have nearly destroyed some of their peach trees by applying an alkali wash.”—C. E. FISHER.

“Queenston, May 22, 1893.—I send you a piece of bark of a peach tree from my orchard, which is full of the little black beetles that we looked for last winter. The bark of this tree is all like the piece I send, and around the collar of the tree there is not less than a gallon of gum that has run out from the wounds made by this borer. Young trees do not seem to be attacked as much as older ones.”—CAPT. JAMES SHEPPARD.

A remarkable feature of the attacks of this minute beetle upon the peach trees, is the large quantity of gum which oozes from the infested trees and falls to the ground. Upon wet days this swells up and lies in masses of jelly around the foot of the tree. I saw in several instances two or three quarts given off by a single tree. This must be a great injury to the trees and accounts for the short time in which healthy, vigorous trees are killed. The statement that only unhealthy trees are attacked is undoubtedly wrong. Mr. Fisher and I noticed in his orchard healthy young two, three and four-year old trees which the beetles had just begun to attack.

“Queenston, March 2.—With this I send box containing bark from peach tree which I had treated with strong lime and Kerosene emulsion wash twice during last season at intervals of about four weeks, for the Peach Bark-borer. I also send you in the box a small package of bark from a large English cherry tree about seven inches in diameter, which stands several hundreds of yards from my peach orchard and quite isolated from any elm or peach trees. The peach bark beetles have been at work in this tree, although they are not nearly so numerous as in the large peach trees. My reason for thinking that the lime and emulsion wash was not very successful was from the fact that, after it had been washed off by the weather, I saw fresh evidences of the borers' work in these trees, the fine chewed or ground bark standing out around the small holes made by the insects. I shall, however, be better able to judge this season as I have five or six trees specially selected to work with. I notice that the oldest trees are the ones selected by the borer, as I find occasionally an old tree in the orchard quite full of the little pest, though, where the insect first started his depredations, small trees only about $2\frac{1}{2}$ or 3 inches in diameter and about four years old, have them in; but they do not seem to be nearly so numerous as in the old trees which have rough surfaces and cracks, where I suppose the insect can more easily secure a lodgement. I applied the wash first, I think, in June and then again in July, on a few others about the first week in August. The bark you have, is from a tree which had the two washes first mentioned. From examinations I have made, I am led to believe the borer does not burrow into the solid wood. To prove this I will saw off a section of a tree and mail it to you to-morrow, so you can prove positively whether or not it does. I shall try your advised experiment—the Kerosene emulsion put on with a scrubbing brush—though I have heard you could not injure a peach tree with scalding hot water.

“I shall try, as you suggest, pure kerosene on one tree. I might try the hot water on another and your emulsion on the balance of them. I believe this borer is getting more numerous, and I hope you will be able to find a sure preventive remedy.”—C. E. FISHER.

All the specimens of bark sent contained living beetles, and those in the cherry bark were the true Peach Bark-borer. Careful examination of the sections of wood sent by Mr. Fisher, as well as by Capt. Sheppard, some of which have been kept in closed jars in my office for nearly a year and in which there are still living beetles, and also field observations at Queenston, show that this beetle works entirely in the bark, where all

the stages are passed. I have not found a single instance where the wood has been penetrated.

"Queenston, March 13.—I examined the trunks of the trees, as you suggested, on a sunshiny day and found beetles crawling with their wings set for flying. You know, ordinarily they do not appear as if they had wings, and those I saw had their wings out ready for use. I will try the alkaline wash, and the first wet day we have when the gum is soft, I will try the brush and emulsion. I believe that, unless these beetles are checked in some way, they are likely to be very troublesome and the cause of much loss to peach growers, as they undoubtedly, to my mind, will destroy the trees unless interfered with."

"June 1.—The peach-bark beetles I have been doctoring with linseed oil. I covered the entire trunk. The first tree, which you saw, to which I applied it, seems as thrifty as any one of the others; it is full of fruit. To two I applied the coal oil; one of them around which I placed a cloth to cover the trunk, at your suggestion, is dying; the other, left exposed, is all right. This contains instruction, I suppose. Those to which I applied the whitewash, have not been free from attack. The linseed oil and coal oil trees have not been bothered since. I shall let you know later how the trees get along, and the beetles also."—C. E. FISHER.

I visited the orchards of Mr. Fisher and Captain Sheppard on April 16th last, just before the buds burst, and found that the beetles were very active and crawling over and boring into the bark in large numbers; but no eggs nor larvæ were found then. Young larvæ were found in the breeding jars in my office at Ottawa early in June, from which the perfect beetles emerged in large numbers in the last week of July and into August. I am of the opinion, although I failed to trace it this year, that there is a second brood from eggs laid in August, which matures before winter and hibernates as perfect beetles in the bark. I have found perfect beetles in the bark from November till April, young larvæ in June, pupæ in July, perfect beetles by July 27 and through August.

In a letter to the *Rural New Yorker*, Mr. Slingerland, of New York State, says: "Eggs have been found in May and July, larvæ and pupæ in July, adults in April, May, July, November and February."

On the appearance of the summer brood, the following letter was written to Mr. Fisher:—

"Ottawa, July 27.—Quite a number of Peach Bark-borers have appeared to-day in the breeding jars. This would look as if the eggs laid this spring had now matured and a brood of beetles was issuing from these eggs. Will you please examine your trees and see if the beetles are not abundant on them just now, running over the bark and sinking fresh burrows? It was supposed that there is only one brood in the year, but the above would certainly look as if there were two, at any rate. I notice that the beetles are pairing, and I imagine eggs will be laid and another brood mature from these eggs this autumn, and pass the winter in the bark, where they will remain until next spring. Please give me your opinion on this."—J. F.

"Queenston, Oct. 15.—Those little Peach Bark-borers have been working worse than ever. First, about the treated trees: Two I treated with pure coal oil; I covered the trunk of one with a sack as you suggested; it died first; the other followed suit about two or three weeks later. The one treated with linseed oil died also, but not until the fruit had about half come to maturity. Those I treated with whitewash and whitewash with Paris green, lived, but became infested with the beetles again after the wash was partially carried away by the rain, and did not do well at all; in fact, they look so bad that I have decided to take them all out and burn the trunks. I treated a large number of trees with the boiled linseed oil, covering the trunk entirely of some of them, of others only in places where beetles had secured a lodgement. All these trees were treated, you remember, after the season was more advanced than when the first one was treated. Those that were healthy, did not seem to be injured by the oil. They passed through the season as well as those with no oil application. Some that were sick, succumbed quite early in the season. I think they were unhealthy at the start. You will gather from this what my conclusions would be. A healthy tree would stand

the linseed oil all right, put on lightly, not thoroughly saturated, after the trees are out in full leaf, but not before. The linseed oil will kill the beetles, but after a time they will trouble the tree again if some are left anywhere. I noticed this, which you may probably know, that old trees, say nine or ten years planted, are more likely to be troubled with the beetles; still, when numerous, as you saw, they attack young trees. The whitewash was not effective. I was thinking, would it do to add to the whitewash carbolic acid sufficient to make a strong odour? Some bugs are sensitive about bad smells. Would this injure the tree? And would it kill the bugs, do you think?

"In reply to yours of July 27th, I examined my trees and found early in August the beetles running over the bark and sinking fresh burrows. About the middle of August they are very numerous, so much so that on a small tree only two inches in diameter, I killed 64 beetles in about 15 or 20 minutes, about sun-down. They must certainly have been a fresh brood, so numerous were they. I believe, with you, that beetles will mature from the eggs laid this autumn and pass the winter in the bark."

"December 31.—We found the beetle active during mild weather in February last, and in this December they worked nearly the whole month.

"Now, my opinion is, that it is dangerous to use coal oil, or linseed oil either, on peach trees before they have the rough furrowed bark. I have several other trees now which I observed this morning, to which linseed oil was applied freely; one I noticed was about dead, a seven year old smooth bark; several others, a year older, partially dead, all smooth bark; others older, rough bark, apparently all right. I think, notwithstanding what you have heard concerning application of coal oil for San José Scale, that it will have to be used with great caution. I regret it very much, too, it is so easily applied and so effectually disposes of them."—C. E. FISHER.

The following letter refers to the same subject:—

"Queenston, December 20.—In reply to yours of the 17th instant, I would say that the Peach Bark-borer can injure seriously, and if not interfered with, will kill peach trees about the third or fourth year after the attack begins. I think all the experiments I have tried have had some good effect; but none have been quite successful. I have used coal oil emulsion applied with a spray pump; also, whitewash and Paris green applied in the same way; also, plain whitewash applied with a brush, and of different degrees of thickness. All the applications seem to check the work of the borer. The Paris green and whitewash, sprayed with force, and the thick whitewash, seem to give the best results. I applied the whitewash and Paris green twice, the whitewash once. I have been told that this borer is known as the Elm-tree Bark-borer, and I notice that they seem to attack peach trees standing near forest trees, more frequently."—CAPT. JAMES SHEPPARD.

The Peach Bark-borer, and the Elm Bark-borer (*Hylesinus opaculus*, Lec.), although at one time thought to be identical, are entirely distinct, as can be seen at once by examining the antennæ. In the case of the former, the club of the antennæ is composed of three separate flattened joints or plates opening like the leaves of a book: although very small, these are easily distinguishable when the insect is moving. In the Elm Bark-borer the club is slightly compressed, ringed, pubescent and oval pointed. This mistake was first made by Dr. Harris many years ago, and was repeated by subsequent writers until attention was drawn to it by Mr. E. A. Schwarz, of the Department of Agriculture at Washington, who has made a special study of the *Scolytidæ*, and who has examined the specimens upon which Dr. Harris based his statements.

The above extracts show that a certain amount of success has attended all of these experiments; and, although some important facts have been found out with regard to the life history of this serious enemy of the peach, particularly as to the early date when the beetles are active and the comparatively long time before the eggs are laid in the spring, yet further investigations are necessary to discover the best treatment and the most suitable remedy. Arrangements have been made for further experiments next season. From the work of Mr. C. L. Marlatt, in fighting the San José Scale, as detailed in *Insect Life*, VII., page 116, it would appear that coal oil emulsion of a much greater strength than was tried in Mr. Fisher's orchard, may be applied with safety to peach trees, and it is just possible that the death of Mr. Fisher's trees may have been due to

some other cause than the applications made to destroy the borers. He has kindly consented to take up the investigation again next spring.

There is no doubt that this is a difficult insect to control, and the usual recommendation has been, in cases of bad attack, to cut down the trees and burn them. It seems to me, however, that less heroic measures will be found to meet the case; for, although this pest is very destructive in certain parts of the orchards in the Queens-ton district, a great many of the trees are only slightly attacked and the wholesale destruction of them would entail much unnecessary loss. I believe that frequent applications of weak insecticidal or preventive washes, perseveringly made at regular intervals from the beginning of March to the end of May, and again when the beetles appear in July and August, would prove effective.

The greatest success may be expected from ordinary Kerosene emulsion (Riley-Hubbard formula), reduced with 15 parts of water, linseed oil, whitewash and Paris green, enough of the latter to give the wash a green tinge; whitewash and carbolic acid, one ounce to a pailful of wash; and particularly the ordinary "Saunders Wash," which consists of soft soap reduced to the consistence of thick paint by the addition of a saturated solution of washing soda in water. If applied during the morning of a warm day, this will dry in a few hours, and form a tenacious coating not easily dissolved by rain. As a preventive wash, this has been found excellent upon young apple trees, and should be applied to all fruit trees as a regular horticultural method every year. It could not injure even young peach trees. I believe that a satisfactory remedy for the Peach Bark-borer will depend largely on beginning operations early enough in the spring. Our present knowledge of the subject would indicate the 1st of March to be about the proper date.

Since the above was written, the following important communication from G. C. Snow, New York, to the *American Agriculturist* has appeared in their issue of January 5, 1895:—

"Experience with the Shot-hole Peach borer."

"Two years ago I had several peach trees infested with the Shot-hole borer of the peach, strong, well-loaded early Crawfords. Under directions given by Dr. Lintner I applied kerosene with an atomizer twice thoroughly, the object being to get the kerosene in the holes as far as possible. The application was from the ground up to and as far on the large branches as the beetles were at work. The trunk was saturated. The kerosene, apparently, did not kill the beetles or injure the trees. There were five infested. However, one tree ripened its fruit prematurely, presenting all the characteristics of the yellows, except habit of growth. That tree died in the fall, I believe, from the damage by the beetles, the other trees ripened their fruit at the proper time, but it was of no flavour or value, though fairly good in appearance. These trees came out as well as ever the next spring and are in fine health yet. Some other trees were slightly affected at that time. Since then I have had no trouble from the attacks of the beetles. I wash all trees thoroughly in the spring with the usual material, with the addition of carbolic acid."

THE SPOTTED PARIA.

(*Paria sex-notata*, Say, Fig. 17).



Fig. 17—The Spotted Paria, life size and enlarged.

Attack.—Small, shining brown beetles, shaped as in the figure — $\frac{1}{8}$ of an inch in length; varying much in colour and markings, but in the commonest form having honey-yellow wing-cases, each bearing two large black blotches; thorax reddish brown; eyes black; legs yellow. In many specimens the markings cover the greater part of the wing-cases; and in some, not only the wing-cases, but the thorax as well, is entirely black. All of these varieties occur together on the same plant.

The attacks reported this year have been only on raspberries, but occasionally the strawberry also is injured. The damage is done early in the season at the time of the bursting of the buds of the raspberry, and is frequently serious.

Depredations by this insect have been reported to me many times during the past three or four years ; but I have held the matter back, hoping to be able to work out the life history. So far, however, I have been unable to obtain eggs or any definite information in Canada except with regard to its injuries. An interesting account of *Paria aterrima*, Oliv., which seems to be extremely similar if not identical with this species, occurs in Prof. Forbes's *Insects affecting the Strawberry*, 1883 ; but as there are certain dates in that account, that I cannot reconcile with our Canadian observations, I had hoped to obtain material to breed the species through all its stages and compare them : but so far I have been unsuccessful. If *Paria sex-notata* proves really to be a distinct species from *Paria aterrima*, there is little doubt that, like that of the latter, as described by Forbes and Cook, the larva feeds on the roots of strawberries and raspberries. Attention is drawn to this insect now at the request of some of the members of the Fruit-Growers' Association of Ontario. The Spotted Paria does not attack the raspberry alone ; for in 1874 Mr. John McGrady, of Gatineau Point, Que., suffered a disastrous attack upon his strawberry beds, many of the plants having the leaves completely devoured and the crop ruined. It was found that hellebore was quite useless against the enemy, and later experience has shown that much stronger poisons are necessary against this beetle than for many others. The beetles appeared suddenly and disappeared again as suddenly about ten days later. For three seasons past, the Spotted Paria has been the cause of much loss in some raspberry plantations in the Grimsby, Ont., district. On May 1st, Mr. Linus Woolverton wrote :—"I send you some specimens of a little beetle occurring here in large numbers in our raspberry plantations eating up all the buds. Please say what it is and prescribe a remedy. We fear some plantations will have no fruit left." The following letters from Mr. Martin Burrell, of St. Catharines, Ont., a careful experimenter and successful fruit-grower, will show how difficult an insect this is to combat :—

"May 13, 1891.—Will you kindly give me the name and general habits of the inclosed beetles? My raspberry canes are literally infested with them and I think I am not overstating when I say that one-half of the buds have been eaten and nearly all the young leaves punctured.

"Their very objectionable method of work seems somewhat similar to that of the Grape-vine Flea-beetle, but this, apparently is no flea as far as jumping goes ; for, when detected, he immediately turns over on his back and rolls on to the ground curculio fashion. I sprayed my patch yesterday morning at the rate of 2 ounces of Paris green to 40 gallons of water, but the beetles are still in great force ; though possibly 24 hours is not long enough for the poison to take effect. Some blackberry canes adjoining the raspberry patch are scarcely touched by them."

"May 26, 1891.—Many thanks for your kind letter of the 16th inst., identifying the Paria beetle for me. They are most troublesome, and were apparently quite as cheerfully active after two sprayings with Paris green as before. I have given them a third spraying—4 ounces to 40 gallons—and even this did not completely rout them, tho' a slight rain 24 hours after spraying may have prevented the poison doing its work fully. The raspberry canes are so far advanced now, however, that I fancy the beetles can do little harm, unless in the way of providing another crop of the pests for 1892."

"Dec. 30, 1891.—I found that *Paria sex-notata*, which you kindly identified for me, very difficult to destroy ; the little villains very seriously injured my raspberry crop and it would certainly take as much as 4 ounces of Paris green to 40 gallons of water to affect them."

"Feb. 17, 1892.—With regard to your inquiry as to my spraying for the Paria-beetle last year, I find in my note book :—

"May 11.—Sprayed raspberries for beetle with 2 ounces of Paris green to 40 gallons of water.

"May 14.—Beetles still thick ; only found two dead. Sprayed again 3 oz. to 40 gallons, comparatively ineffective.

"May 20.—Sprayed again 4 to 40, as the beetles were still very thick."

"I find that rain fell 24 hours after the last spraying and I presume partially destroyed its efficacy. I cannot find that I sprayed again, but my impression is that even this dose did not completely fix things; but by this time I think the leaves had pushed on so far that the beetles could not do much damage. As to the effect on my crop, I am perfectly safe in saying that at least one-third of the crop was destroyed, in many cases every bud on the cane being eaten out. I found that the beetles were generally very shy and wary, on being approached, running to the edge of the leaf and rolling off, or else turning over on their backs and simulating death."

"May 20, 1892.—My old enemy, *Paria sex-notata*, has revisited me this spring in greater numbers than ever. I sprayed with Paris green 4 ounces to 40 gallons, but the foe still bobbed up serenely. To give you some idea of the damage it has done me this year, I may state that out of a quarter of an acre of raspberries not a score of canes have leafed out. I am not the only victim this year, as several of my neighbours have been seriously injured by the beetles; I strongly suspect that their canes were more or less injured last year, but they do not seem to have been aware of the existence of the beetle, and some even this year failed to attribute the damage to the right cause. Where the patches are badly affected, I have advised taking out root and branch and burning, and presume this to be the best course. Do you know how many eggs the beetle lays? Or have you in any way traced out its life history?"

"I might mention that I found one specimen eating a grape vine bud. Is this new to you?"

Mr. John Craig, the Horticulturist of the Central Experimental Farm, found this insect early in May last injuriously abundant in raspberry plantations on the road between Hamilton and Grimsby.

Mr. Adolphus Pettit, of Grimsby, stated that it was in great numbers on a neighbour's raspberries, working on the unopened buds and young leaves, and it occurred on many other fruit farms.

Remedies.—The Grimsby fruit growers were recommended to dust the bushes at once with Paris green and slaked lime, or some other quite dry powder, 1 pound of the former to 25 pounds of the latter. This mixture is easiest applied by putting it into a

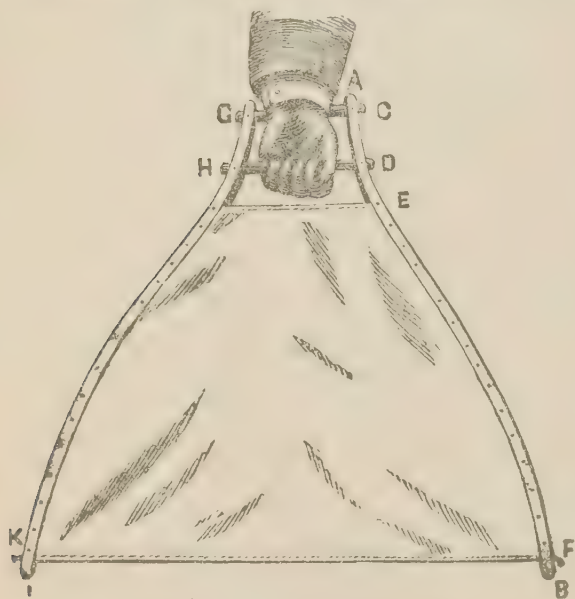


Fig. 18.—Beating net.

bag of cheese cloth and shaking or tapping it over the bushes. Of course, if this can be done when there is a dew, it is so much the better. Owing to the difficulty of destroying these beetles with poisons and the small quantity of foliage on raspberry bushes at the time of attack, perhaps the most practical remedy will be found to be beating the insects off into a beating net, a light wooden frame with cotton stretched tightly between the side pieces (Fig. 18), and then destroying them by throwing them into some vessel holding water with a little coal oil on the top. An easy plan for collecting them is to hold an open and inverted umbrella beneath the canes when beating them, and then brush the insects out into the coal oil pan.

In a report which Mr. Woolverton has been kind enough to send me on the injuries to fruit crops by insects during 1894, he says:—

"The Spotted *Paria* was very troublesome about Grimsby this spring, eating out the buds of the raspberry, and thus materially reducing the crop. I have made public the remedy you prescribe, and it will be tried faithfully next season by our growers."

I shall be obliged to any fruit grower who, next season, will notify me promptly of the occurrence of this insect on its first appearance, and send me living specimens for study.

THE APIARY.

In the autumn of 1893 arrangements were made, in response to several representations made to the Honourable Minister of Agriculture, to institute an Apiary at the Central Experimental Farm. At that time, 10 swarms of the Common Black Bee were purchased. In the spring of 1894 a suitable space was chosen near to the house of Mr. John Fixter, the farm foreman, who had some experience in the care of bees, and who undertook the practical management of the apiary. He has had the sole charge of the bees during the season, and has carried out most carefully with the assistance of his brother, Mr. George Fixter, such experiments as I considered it wise to undertake the first year. I beg to acknowledge gratefully much assistance and valuable advice received from Mr. R. F. Holtermann, of the Goold, Shapley & Muir Co., Limited, Brantford, and Editor of the *Canadian Bee Journal*. In consulting with Mr. Holtermann as to the most useful experiments which could be undertaken with such swarms as we had and under the existing circumstances in our apiary (with which he was well informed) he was good enough, not only to suggest a useful line of experiments to compare the different kinds of foundation comb used by beekeepers in the Dominion, but himself to prepare the foundations for these experiments.

On receipt, these specimens of foundation comb were kindly weighed accurately by Mr. Frank T. Shutt, the Chemist of the Dominion Experimental Farms, and then at the end of the season were again weighed after the honey was extracted. Mr. Shutt has been good enough to prepare a report submitted herewith on these comparative weighings, and has drawn some deductions therefrom which will be read with interest. I also submit an interesting report on the management of the apiary by Mr. Fixter.

The two Italian queens referred to, which were substituted for two of our own, were of a race procured from Mr. Holtermann, of which he says: "They are of a set very light in colour which are at present so freely praised on one side, and on the other as freely condemned. It would be a good experiment to try them at Ottawa for wintering as well as for worker qualities next season."

The annual meeting of the County of Russell Bee-keepers' Association was held on October 16, at Chard, Ontario. This meeting was attended by Mr. Fixter, and he gave an account of the work being carried on with bees at the Central Experimental Farm, which was listened to with pleasure and interest.

We have now in the apiary 20 hives of bees, and preparations have been made for repeating the experiments undertaken this year with foundation combs, with different bee-fodder plants, and as to the best method of preventing injury of the bee-moth. I append herewith reports prepared at my request by Messrs. Fixter and Shutt.

REPORT OF MR. JOHN FIXTER

First steps were taken in the Bee department in the autumn of 1893, when several swarms were purchased. They were weighed in the autumn before being put into the cellar, and again in the spring of 1894. In spring they weighed on an average 20 lbs. less per colony; this reduction is considered large and resulted from the temperature of the cellar being very low during the winter which necessitated the bees consuming more honey than if the cellar had been a few degrees warmer. During November and December, 1893, the temperature varied from 34 to 38 degrees Fahr.; during January, 1894, 32° to 34°; February, 32° to 34°; March 38° to 40°; April 1st to 12th, 40° to 48°. These temperatures are considered too low; from 40° to 46° has been found the best temperature for the whole winter. On April 12th, 1894, the bees began to get uneasy, and, the weather being very fine, they were taken out of the cellar and placed on the summer stands. The first ten days they gathered pollen very freely; after that a very

cold wet period set in and lasted several days, when it was found necessary to feed several of the swarms with syrup (2 parts of granulated sugar and 1 part of water) put moderately warm into a Miller feeder and fed in the evening. Swarming began June 14th. The increase in the number of colonies was very small, and the honey flow of the past season has been poor, not only in the Ottawa district, but in many parts of Ontario and Quebec; several bee-keepers have stated that the past season has been the poorest for many years. The apiary on the farm gave an average of $23\frac{1}{2}$ lbs. of honey per colony. There was very little honey gathered from clover this season, the bees made most of their store from the basswood (or American Linden) and the honey did not increase in weight after the basswood ceased to flower. No honey was gathered by our bees from buckwheat, as there are no fields of this crop within several miles of the farm. In the experimental work with foundation combs, the following swarms were selected for the experiment: No. 20 was a swarm that came off a colony of Common Black Bees on June 23 and weighed 9 lbs.; No. 21 was partly Italian and partly Common Black Bees, both swarming together on June 24; the weight of this swarm was $9\frac{1}{2}$ lbs.

On August 4th two thoroughbred Italian Queens were presented to the farm by Mr. Holtermann to be introduced into the apiary. Two hives of Common Black Bees were selected that had a good quantity of honey and brood, with young bees just coming out. The old queens and 12 workers with each, were first taken from the swarms and put into a cage, until it was found that the Italian queens had been accepted by the swarms. The Italian queens were introduced as soon as the old queens were taken away, the cage being placed lengthwise on the top of two frames of honey and brood, the bees being allowed to eat their way through about one inch of honey and sugar before the queens could get out. Drone traps were placed at the entrance, so that if the queens attempted to leave, or if any attempt was made to carry them out, they would be easily seen. Both swarms took kindly to their new queens, and 27 days afterwards young Italian workers were noticed.

September 24th: the hives were all weighed and several were found to be short of stores to carry them through the winter. All hives that did not weigh 50 pounds were fed, September 27th, with a syrup, two parts of sugar and one of water, fed moderately warm, in the evening, in a Miller feeder; 6 swarms before being fed weighed $214\frac{3}{4}$ lbs., and were given 116 lbs. of syrup. In 18 days afterwards they were weighed again and weighed 297 lbs., making $33\frac{3}{4}$ pounds less weight than was fed. On November 9th the hives were all weighed again, immediately before being put into the cellar. These same six swarms weighed 286 pounds, being 11 pounds less than on October 12th. This experiment indicates that a person feeding should allow about one-third more syrup than the weight required to make up each hive to 50 pounds.

The temperature of the cellar, November 9-30, 1894, varied from 40° to 44° F.

REPORT UPON AN EXPERIMENT WITH SOME BRANDS OF "FOUNDATION," BY FRANK T. SHUTT, M.A., F.I.C., F.C.S.

Wax, like honey, is a true secretion and not a material gathered by the bees, special cells or glands having for their function its production. It differs from honey, however, in its formation in certain particulars. Honey would appear to be the result of the action of a diastase or ferment, produced by certain cells in the bee, upon the cane sugar contained in the nectar gathered from flowers. Wax is manufactured, so to speak, in the bee, and is the result of the physiological function of certain glands, as already stated. Wax, therefore, is produced at the expense of the honey or sugar (as the case may be) consumed by the bee. Thus Dumas and Milne-Edwards found that bees fed with 500 grammes of sugar produced 30 grammes of wax, the same weight of honey only yielding 20 grammes. It would also appear that although pollen is not absolutely necessary to the production of wax, its consumption by the bees greatly reduces the amount of honey or sugar otherwise required (Berlepsch). From this it is evident that wax is secreted, primarily at the expense of the tissue and, secondarily, of the food consumed.

In supplying "foundation" to the bees, the object is to save much of this expenditure, and thus allow the bees more time and energy for the production of honey.

The primary object of the present series of experiments, as suggested by Mr. Holtermann, was to ascertain the relative ease with which the various foundations tested were drawn out and used by the bees; it, naturally, being held that those would be the most profitable which were utilized in this way to the greatest extent by the bees, or, in other words, those to which the least wax was added by the bees in building the comb. It will be seen that other and perhaps more important results have been incidentally obtained.

The experiments were conducted as follows:—
The frames were filled with the various foundations under test, and the exact weight of two inches square, noted. At the close of the season a similar area of two inches square was cut out of the centre of the full comb, the caps of the cells carefully removed and the honey, was extracted with the extractor and finally by successive exhaustions with cold water. The empty honey-comb was finally allowed to dry in the air and was weighed.

The following tables give in consecutive form the data obtained and the averages therefrom.

EXPERIMENTS with Various Brands of "Foundation," 1894.

Designating Letter.	Name of Wax and Mill.	Milling Temperature.	Weight in grams of "foundation," 2 inches square.	Weight in grams of empty honey-combs, 2 inches square.	Weight in grams of wax added by bees, per 2 inches square.	Percentage of wax added by bees.	Approximate measurement of one pound.
A.	Choice wax, Root mill, outer section.	89 F.	1.4010	2.8335	1.4325	102.2	} 9.0 sq.ft.
B.	" " " "	89 F.	1.4010	3.0804	1.6830	120.1	
C.	" " " "	120 F.	1.2040	2.6025	1.3985	116.1	
D.	" " inner section.	120 F.	1.2040	2.8635	1.6595	137.8	} 10.5 "
E.	Foundation in general use, outer section.		1.4145	2.5650	1.1505	81.3	} 8.9 "
F.	Foundation in general use, outer section.		1.4145	2.4805	1.0660	75.3	
G.	Heavy sheet, Root mill, outer section.	120 F.	1.3157	2.8165	1.5008	114.0	
H.	" " inner section.	120 F.	1.3157	2.6750	1.3593	103.3	} 9.6 "
I.	Inferior wax, Root mill, inner section.	120 F.	1.1670	2.5340	1.3670	117.1	
J.	" " outer section.	120 F.	1.1670	2.5050	1.3380	114.7	
K.	" " " "	89 F.	1.2240	2.5410	1.3170	107.6	} 10.8 "
L.	" " inner section.	89 F.	1.2240	2.8060	1.5820	129.2	
M.	Choice wax, Given press, inner section.	120 F.	1.8010	3.0565	1.2555	69.1	7.0 "
N.	Patent process, 12 sq. feet, inner section.		1.0040	2.7665	1.7625	175.5	12.5 "
O.	Patent process, 15 sq. feet, inner section.		1.0930	2.9115	1.8185	166.4	11.5 "
P.	Inferior wax, Given press, inner section.		1.5820	3.0090	1.4270	90.0	8.0 "

cally to the economy of supplying the bees with a foundation of not more than seven and a half feet to eight feet to the pound.

3.—That a dark or deeply coloured foundation gives a dark and unsightly “fish-bone” in the resulting comb, materially affecting its palatability and injuring the sale.

4.—That in addition to what has already been said, there appears to be some support to the theory that certain waxes are more easily worked and drawn out by the bees than others. The results obtained in the experiments with the “foundations in general use” and the “inferior waxes” from the Root mill, would, apparently, lend weight to this view. The facts at our command do not at present allow of any general conclusion being arrived at on this point. There can be no doubt, however, that this factor cannot, in view of the data here given, be of equal importance with that of the weight of wax supplied to the bees in the foundation.

5.—That the present experiments give no definite results that would enable us to draw conclusions as to the relative merits, as regards working by the bees, of wax melted at high and low temperatures.

It might be urged from what has already been said, that it would be economical to supply all the wax necessary for the construction of the comb. There are, however, no facts to support this extreme view. The production of the wax by the bees is a normal function, and its entire cessation might possibly affect the honey yield or lead to a disarrangement of the general health of the bees. There is probably a limit in the amount of wax that can be advantageously furnished as foundation, a limit to be ascertained by future experiments.

SOME SPECIALLY NOXIOUS WEEDS.

Of the many weeds which have been sent in for identification or inquired about during the past year, there are a few which require more than a passing notice just now. Great attention has been given to this most important subject by the superintendents of all of our branch farms. Mr. S. A. Bedford, of Brandon, has forwarded for identification many specimens from farmers in his district, and has done good work in speaking at meetings on the practical treatment of these agricultural pests. Mr. Bedford has besides prepared for exhibition to farmers, specimens of the more injurious weeds. Mr. Angus Mackay, of Indian Head, has done excellent work in the same line, and has collected for the North-west Assembly specimens of Tumble Mustard, French Weed and others, for exhibition purposes. Mr. Thomas Sharpe, of Agassiz, states that there is a good deal of interest shown by farmers in British Columbia about noxious weeds. He thinks that many of these plants are being introduced in packages of trees, stock cars, etc., and has asked that a collection of mounted weeds might be supplied him for exhibition, as many of the farmers do not know the appearance of some of the worst weeds until these get to be a serious pest, and eradicating them is a costly undertaking. Col. W. Blair writes in a similar strain from Nova Scotia, and among other things reports that the Corn Spurry (*Spergula arvensis*, L.), lately recommended by some as a fodder plant, is one of the very worst weeds in his province. I would draw particular attention to the following imported weeds which call for special efforts.



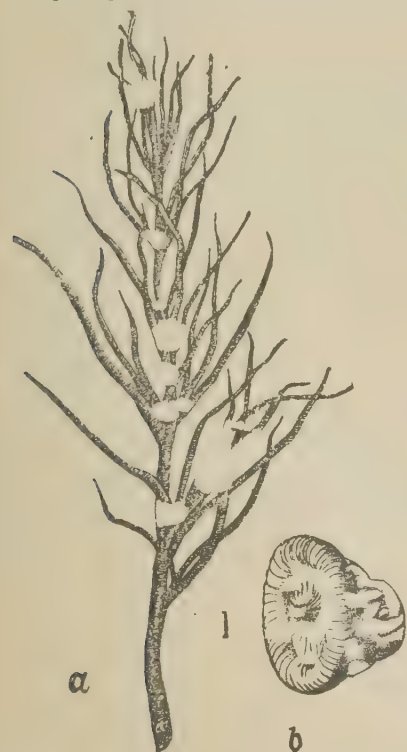
Fig. 19.—The Russian Thistle : a branch of a mature plant.

THE RUSSIAN THISTLE or Russian Tumble-weed (*Salsola Kali*, L., var. *Tragus*, DC., Fig. 19) referred to in my last report, was detected in July last in Manitoba. Immediately on receipt of specimens, I prepared for distribution to the farmers of Manitoba and the North-west Territories a short bulletin (Experimental Farm Notes, No. 4) giving an illustrated description and concise history of the weed, and suggestions as to the best steps to be taken to prevent its spread. At the same time, the Manitoba Government adopted vigorous measures to fight this terrible pest of the Dakotas and some of the other North-western United States. The farmers of the west, and in fact of the whole Dominion, seem to be thoroughly aroused and to recognize the danger of neglecting this enemy. This is evidenced by the very large number of letters of inquiry and specimens sent in to see if they were the Russian thistle. These specimens were for the most part the true Tumble-weed of the west, *Amarantus albus*, L. from Manitoba, the North-west and British Columbia, and *Sonchus arvensis*, L., from Ontario and Quebec.

Although I have made inquiries from correspondents in Manitoba during the last two years as to whether they had observed any plants of the Russian Thistle, I could not learn of its occurrence in Canada until July last. However, Mr. James Dale, of Grund, Man., sent me in the beginning of September, old stems of the previous year. I was under the im-

pression that this was the first record of the occurrence of the pest in Canada, but I find, from an extended report by Mr. A. K. Leith, the Inspector of Noxious Weeds, of the Manitoba Department of Agriculture and Immigration, an advance copy of which has been kindly placed in my hands through the courtesy of the Hon. Thomas Greenway, Minister of the Department, that the Russian Thistle was first noticed five years ago on a farm occupied by one Peter Rhimer; but it was not till three years ago that it spread far over the district. Under instructions from the Hon. Thomas Greenway, Mr. Leith has made a very thorough search through those districts of Manitoba, where it was thought that the weed was likely to occur, and has explained to the settlers the danger of neglecting this enemy. He has also, by order of the Provincial Government, taken such steps as were possible to bring about its extermination. The weed was found in surprising quantities in some localities, as around Morden, where "it was so thick and dense that the crop was entirely choked out. On a piece of land of about five acres, a farmer, Abram Wiebe, cut with a mower and raked up over 90 cocks as large as good sized hay cocks which after drying out, he burnt." Mr. Leith went through the Mennonite reserve and found the pest all through the country in a greater or less degree. The way it was scattered seemed to indicate more that it had

been spread in seed grain than by its natural manner of rolling. Very little indication of it was found on the natural prairie, except where there was loose earth around gopher holes. The Mennonites all know the plant, but, as a rule, are indifferent whether it is on their land or not, although a few seemed anxious to secure its extermination. The farmers of Manitoba are to be congratulated on the vigorous manner in which the endeavours to exterminate this weed have been prosecuted by the Provincial Department of Agriculture. In addition to the many localities where the Russian Thistle was found on the Mennonite reserve, small patches were also discovered at Carman, Souris, Wawanesa, Belmont and Baldur, all of which were carefully destroyed by order of the department. Although I do not think it at all likely that the Russian Thistle will become a dangerous weed in Ontario, where it has little chance of "tumbling," it may be well to state that vigorous specimens have been found along the Grand Trunk Railway, south of Lake St. Clair by Mr. J. Dearness, of London; at Toronto Junction, in the Canadian Pacific Railway yards, by Miss Zelma Bogart; and at Smith's Falls on the same railway, by Prof. John Macoun.



The Russian Tumble-weed or Thistle will be easily recognized from the figures of a mature branch, an immature branch and seed shown herewith (Fig. 20). The plant most frequently mistaken for it is the true tumble-weed, *Amarantus albus*; but the two can be at once distinguished by the fact that, when the plants are immature, the leaves of the true tumble weed are expanded into a blade half an inch across, while those of the Russian Thistle are thread-like and fleshy. When ripe, the seeds of the former are lens-shaped, black and highly polished, not more than $\frac{1}{25}$ of an inch in diameter, while those of the latter are shaped as in the figure, dull gray and nearly $\frac{1}{8}$ of an inch in their greatest length.

Some other western weeds have attracted attention by their aggressiveness during the past season. Mr. A. Mackay writes from Indian Head:—"I can safely say that one half of this farm was literally covered with plants of the TUMBLE MUSTARD, *Sisymbrium sinapistrum*, Crantz, blown in from adjacent farms on November 14, last. By good luck, the greater part of this was fallowed last summer, and I hope not many plants will appear next year in the crop. In 1893 there was not a plant in this whole lot. This year when we ploughed the field for the first time, it was a mass of flower, and the plants were so thick that every foot was covered with the weed. The tree plots, garden plots and all places of that nature were filled up, and continued so

till the frost came. Of course, we ploughed, hoed, scuffled, as each new crop came up, and kept them from going to seed. But with fresh importations from the same quarter this fall, I have no doubt there will be plenty again next year. All our crops had more or less plants in them. We pulled them whenever it was practicable; but some places were so bad that we did not touch them until the grain was ripe. The plant is easily killed by fallowing the land, but it is spreading fast in the direction of the prevailing winds. Our council has power to cause the destruction of this weed, and likely will take steps the coming year to do so. If something is not done soon, this whole country will be overrun. Russian Thistle has not made its appearance here yet, and I hope it will not; but, as a weed, it is not any worse than our own tumble weed."

There is another member of the Mustard family which is just getting a footing in the North-west Territories as a noxious weed, *i. e.*, *Erysimum orientale*, R. Br., which has been sent to me by Mr. Mackay, from two or three localities in the same district, and from Beulah, Manitoba. Mr. Mackay says under date of August 29: "The weed *Erysimum orientale* is not on the farm, but is found five miles from here, and has caused considerable loss to the farmer on whose place it has obtained a foothold. I think it is only

on this one farm, and has been there for six or seven years. I send you seeds, young plants just starting and full grown specimens, all collected together." This plant is a slender branching annual with grayish green succulent leaves, on the stem oblong oval in shape and clasping at the base: the root leaves are spatulate, more elongated and not clasping at base. The flowers are small, of a creamy white, and borne at the tips of the branches; they are followed by square pods sometimes three inches in length, containing rather large blackish seeds. From what we know of this plant, there is every indication that it may develop into a troublesome weed, and it requires to be watched. This remark also applies to two other members of the Mustard family, which are every year becoming more abundant, *Neslia paniculata*, Desv., and False flax (*Camelina sativa*, Crantz). The name given in English books for this weed is "Hare's Ear Mustard,"

PERENNIAL SOWTHISTLE, Field Sow-thistle (*Sonchus arvensis*, L.). There are, I believe, in the older portions of Canada few noxious plants which are spreading more rapidly and doing more harm than the Perennial Sow-thistle. It is alarmingly abundant through the province of Quebec and throughout the Maritime Provinces. It is a perennial with strong underground stems, which spread out a long distance from the centre. The leaves cover the ground closely and choke out the crop among which the plant grows. The flowering stems, about three feet in height, have no leaves towards the top, where they bear three or four large yellow flowers, which are conspicuously glandular hairy outside and on the footstalks. The seeds are provided with a copious pappus of pure white silky down, by means of which they are blown long distances. At the time the small grains are in flower or a little later, this plant is easily detected in a crop, from the flowers generally standing up a few inches above the grain. As soon as the conspicuous flowers are seen, every stem as well as the rosette-like tuft of leaves around the base of the main stem, should be pulled. This can easily be done at this season, and as soon as the crop is harvested, the stubble should be ploughed. I am informed by Prof. E. A. Barnard, of Quebec, that in some places this plant is so abundant as to have acquired the name of *Crèves-yeux* (Hard on the eyes) from the necessity of covering the face with a veil when threshing grain to keep the particles of down out of the eyes. When this plant is once noticed in a piece of land, every effort should be made to eradicate it, and this requires the greatest care and perseverance.

REPORT OF THE POULTRY MANAGER.

(A. G. GILBERT.)

To WILLIAM SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit to you the seventh annual report of the Poultry Department.

Among the subjects treated, with a view to the winter production of eggs, are :—

1. Different rations and their constituents.
2. Rations within easy reach of the farmer.
3. When and how to feed the rations.
4. The essentials necessary to success.

The Diseases of Poultry and their treatment, also receive some attention.

During the year meetings were attended at Manotick, Hensall (2), Dashwood (2), Wingham (2), Harrow (2), Toronto, Richmond and Cornwall (2), in the province of Ontario, and at Aylmer, P.Q., on two occasions. At these places 16 addresses were delivered on the proper care and management of poultry.

I have to acknowledge the reception of settings of eggs, kindly presented to the Department by the following :—

1 setting White Leghorns (Wychoff strain), from Mr. A. A. L. Jack, Chateauguay Basin, P.Q.

1 setting White Leghorns from Mr. A. G. Brown, Watford, Ont.

1 setting Barred Plymouth Rock eggs from Mr. A. Flawn, London, Ont.

The experimental work and results are given in report.

One result obtained, worthy of particular note, was that from the careful treatment of the hens during their moult. As the moulting period approached the hens were put on a generous diet, similar to that given for egg production. With a free run in the fields and the treatment mentioned, the yearling hens, followed by the two-year-old stock, were first over their moult and as a result 538 eggs were had during December, most of which were laid by them. The unusually mild weather in December was no doubt a factor also, but the fine appearance and condition of the stock were too decided to leave any doubt, as to the benefits of care, good feeding, and housing of young stock. As a rule the laying stock of the farmer receive no particular attention at their moult, and most of them are kept until they are too old.

I am, sir, your obedient servant,

A. G. GILBERT,

Manager Poultry Department.

RATIONS.

During the past year careful consideration has been given to, and observation made of, the effect of varied rations in producing eggs in the different seasons. Perhaps closer observation was made during the winter season—the period of artificial existence—with the object of producing eggs, at as little cost as possible at the time when they are highest in price. The substance of these observations will be found in the following pages. It is obvious that the cheaper the cost of production the greater will be the margin of profit, and if we can have this cheap food easily available, so much more beneficial will it be to the farmer and poultryman. It may be like going over old ground to discuss the subject again, but it is one of very great importance, and in which every year makes some important difference and all in the way of advancement. Again, more importance attaches to the subject, because the procuring of a cheap and effective egg-producing food, for winter use, has lately engaged the attention of leading scientists and practical poultrymen in Great Britain and this continent to a greater extent than ever before. Among the leading authorities in England, who have given the subject their attention during the past twelve months is Mr. R. Warrington, a chemist, who says in an article on “poultry and poultry rations” in the *Agricultural Gazette* of London:—“The winter production of eggs and the rearing of early spring chickens, so that the highest prices may be realized in each case, is not made the subject of careful study.”

THE HEN AN IMPORTANT FACTOR.

And in order to make good his contention he gives the following figures. He says:—“A good cow may produce in a year six times her weight of milk, with a calf in addition. If we take the cow as weighing 1,000 lbs., we have in the salable product about 800 lbs of dry matter, containing 36·8 lbs. nitrogen. Hens of good laying breeds, weighing 1,000 lbs., will in the same time lay 6,000 lbs. of eggs, the contents of which will include 1,404 lbs. of dry matter containing 120 lbs. nitrogen.” In corroboration of this statement, Mr. M. G. Gillikins, another authority, shows in a table prepared by him that taking the Hamburg hen as a layer of 200 eggs per annum, that she will in that number of eggs lay 6·40 times her live weight. He puts the Spanish and Leghorn next with 190 or 150 eggs each, or 4·22 times their weight. “This goes to show,” he says “that in the year of their best production, viz., the second year, the best laying breeds will furnish five to six times their weight in eggs.” Thus we have two good authorities arriving at the same conclusions, which go to show that the hen is being recognized by leading authorities as an important factor in agriculture. Returning to Mr. Warrington and how to feed the hen, he says: “that since cows milk is much richer in nitrogen than the carcass of an animal, so the food supplied to cows should be of a specially nitrogenous character. The argument”, he says, “has still greater weight in the case of the hen, as we have seen that her production in the same time from the same body weight contains three and a quarter times as much nitrogen as that of the cow.” It will be interesting to consider some of the best egg producing rations within easy reach of the farmer.

DIFFERENT FOODS.

RATIONS WITHIN EASY REACH OF THE FARMER, THE DAIRYMAN AND MARKET GARDENER

What should be aimed at, and what has been sought after in the poultry department is to have an effective and cheap ration. What is required is a well balanced

ration. Col. T. D. Bliss, in Hoard's Dairyman, gives the following list of foods and their description :—

Highly Nitrogenous Foods—Skimmed milk, buttermilk, cotton seed cake, linseed meal, rape cake, malt sprouts, brewer's grains, sunflower seeds, hempseed cake, red clover before bloom, young pasture clover, rich pasture grass, lucerne before bloom ; flaxseed, pea-meal.

Foods with an excess of Carbonaceous Matter.—Cream, oat bran, corn bran, wheat middlings, corn, buckwheat grain, oats, barley, rye, carrots, sugar beets, potatoes, corn cobs, ensilage, fodder rye.

The following are given as useful forms of food for poultry :—

Cow's milk, barley middlings, buckwheat bran, barley bran, rye bran, coarse wheat bran, cotton seed, millet, wheat, turnips, cabbage, white clover, red clover, and alsike.

SUITABLE FOR BOTH THE DAIRY COW AND THE HEN.

In the list will be noticed cow's milk, wheat, turnips, red clover, cabbage, wheat bran and buckwheat bran, all of which are more or less available on a farm, particularly where cows are kept in any number. Indeed, the objection may be raised to the vegetable and some of the other materials named, on the ground that they are intended more for cows than hens. But it is a point in favour of the poultry department, that the food which is best suited to the dairy cow is also the best for the laying hens. As a matter of fact much of the waste of the dairy may be utilized as most suitable food in the hennery. In the first report issued by the Experimental Farm Poultry Department will be found the statement "that milk dealers and market gardeners are most favourably situated, as regards the disposal of new laid eggs in winter at the highest figures, for they are among the best people in the city every day." That remark, perhaps, more particularly applied to the opportunities for obtaining high prices, but it is gratifying to find that the dairyman is still more favourably situated, inasmuch that the waste material, or at any rate the material that he has in abundance in his establishment, is one of the best rations for poultry. The waste of the market gardeners, in the shape of unmarketable vegetables, &c., &c., is suitable as good food for egg production.

Cow's MILK.

As to cow's milk, not long since, I had a letter from a gentleman in the province of Quebec, who asked, "if milk is a satisfactory food for hens, as he had plenty of it?" He was answered that it was not only good for his laying hens, but one of the best rations to make his young chickens grow rapidly and vigorously. Again, a leading authority on dairying in the same province wrote me, "If you think milk can be used to good advantage in the poultry department, you will do well by advocating its use, for we are having a large number of dairies started, and there will be plenty of it to spare." As in the previous case, answer was returned that it was one of the best foods for both fowls and chickens.

TOO MUCH GRAIN AND ITS EFFECTS.

The experience of the past seven years goes to show that a great deal too much grain is fed. A farmer writes : "I feed my hens all the grain they can eat and yet they do not lay." It is generally the case that when grain is made the sole feed, the result is fat rather than eggs, and as is frequently stated in our reports, "a fat hen will not be a laying one." No doubt in the case mentioned above the farmer fed altogether too much grain. It must be recognized that fat is a disease in the laying stock. It has been stated in a previous report that the laying stock require, while confined to winter quarters, to be supplied with all the materials necessary to make the shell as well as the egg. In other words that the hen, in winter quarters must be supplied

artificially with what she can pick up for herself while running at large. If grain is constantly fed the first intimation given will be an egg laid with a thin shell. This is a hint that there is not enough egg shell forming material in the ration, or in other words that your ration is not well balanced. It is also noticed that if your stock is composed of Asiatics such as Brahmas, Langshans, Cochins, &c., &c., that they are getting too fat. And if the hint is disregarded, the egg shells will become rapidly thinner, until an egg is laid without any shell at all. Sometimes eggs with thin shells, or without shells, are laid as the result of too much "stimulating," such as the inordinate use of red pepper, or condition powders "warranted to make hens lay."

CLOVER HAY.

Mr. P. H. Jacobs, a chemist and poultry breeder, who has given the subject a good deal of study, says:—"One hundred grains of lime are needed to make a strong shell on each egg, and as 1,000 lbs. of wheat or corn contain less than a pound of lime, the hen cannot get the lime she requires to make a strong shell. We actually require a ton of wheat to furnish lime enough for ten dozen of eggs." The same authority says that there is thirty times as much lime in white clover as there is in the same quantity of wheat, and twenty-eight times as much in red clover. He goes so far as to say that clover will supply "all the lime the hens require." While the latter statement cannot be fully endorsed by experience in our poultry department, there can be no doubt that it is an excellent ration while used with others. It is first cut into half-inch pieces by clover cutters, and steamed during the night by placing it in a pail and throwing boiling water over it; covering the pail and leaving it until morning. The laying stock in our poultry-house did not take to it when given to them by itself, but eat it readily when mixed with shorts and bran, and which without doubt, made a splendid and effective morning ration. While on this subject it might be as well to quote the statement of the late Mr. F. A. Mortimer, of Pottsville, Pa., who kept over 2,000 pure-bred fowls, and who said two years ago in regard to clover "that had he known of the clover hay food for hens, four years ago, (1888), he could have saved \$1,000 and that since he began to feed it that he got more eggs and found fewer sick hens." Mr. Mortimer is credited with being one of the most scientific feeders of his day. Another authority also, a chemist and editor says:—"There is no ready substitute for clover hay as a poultry food. It is not only rich in nitrogen, lime, sulphur, phosphoric acid, magnesia and soda, but also abounds in potash and carbon. *Balanced with a small quantity of grain*, the heat and warmth of the body is secured, and the elements of egg production provided. It is easily digested and avoids over-fattening, the *great scourge* of the farmer and poultryman."

Observation has led to the conclusion, that while wheat is undoubtedly the best all round, or best balanced grain food, that if fed entirely alone produces fat rather than eggs, particularly in the case of the heavy breeds, but when balanced with red or white clover hay is a good egg producer, and both have the merit of being easily obtained.

Cow's milk, while not in great abundance on every farm is generally so with dairy-men. It is a good food for poultry, skimmed, sour, or in the shape of buttermilk.

Vegetables are in good supply on almost every farm, and particularly so with market gardeners. So we have among our well balanced foods articles of diet within easy reach of the farmer.

CUT GREEN BONES.

Not many years ago the orthodox rations for laying stock were grain, vegetables, gravel to grind up the food and lime to make shell, with an occasional warm mash in the morning. Now the three great factors in egg production are cut green bones, green food with grain in moderate quantity, and exercise. The recognition of the poultry department, as an important revenue-producing branch of agriculture, has led to the study of the best means to produce the egg, or, fatten the chicken at the least possible cost,

and the result has been the adoption of green bones as the principal factor in egg production, because it is the nearest approach to a perfect food yet put within the reach of the poultry-keeper. It is understood that we are treating of fowls which live an artificial existence for several months of the year and which are expected to produce during that period the high price egg. No hens lay as well, as when running at large and enjoying a thoroughly natural existence in summer. The aim of the true poultry-keeper is, to as nearly approach as possible these natural conditions in the winter housing and treatment of his laying stock, and he who most successfully does so reaps the richest reward. It is evident that by finding out what the egg is composed of and feeding those constituents, that we are more likely to get the egg. The authorities quoted from, tell us that lime, nitrogen and phosphoric acid, are among the important constituents of eggs. From the same authorities we learn that green bones are rich in albumen, phosphoric acid and phosphate of lime; hence their value as an egg producing food, and their cost is a minimum one. At our poultry department the green bones are delivered by the butcher,—while serving other customers with meat,—at one cent per pound. We are now met with the difficulty as to how the average farmer can procure this food. If the cost is not too much he can purchase a Canadian-made bone mill for fifteen dollars. The question of cost, is no doubt a serious one to the individual farmer, but it can be made comparatively light by a number clubbing together to purchase a small machine and so arranging that it can be used in turn. Or, place a larger one in a creamery or cheese factory, where there is always power and when the farmer brings his milk he can bring the bones and have them cut up. It takes but a short time to cut up enough bones to feed 50 or 100 hens, once a day, or three times per week. It is but reasonable to anticipate, that when the demand for this food becomes general the large butchering establishments, or *abattoirs*, will cut up the waste bone, and supply the farmers with it, at a moderate figure, say one cent per pound. Cut green bones should be fed in the ratio of one pound to every sixteen laying hens.

OTHER EGG-PRODUCING RATIONS.

Should it be difficult or impossible to procure cut green bones, the heads, livers and lights of animals killed on the farm may be used, after being well boiled. In some poultry districts no part of an animal that will make clean, wholesome food is allowed to go to waste. This boiled food may be fed separately, or cut up into fine pieces and mixed with ground grains, so as to make a warm morning mash, which should always be fed in a crumbly condition. In such a case, or, indeed in any case, the table and kitchen waste can always be utilized in the warm morning mash. Lime for shell, and the necessary grit, will have to be supplied. The afternoon ration will be a liberal one of grain. Rations might be arranged as follows to meet almost every case.

RATION 1.

Morning.—Boiled heads, livers, lights, &c., cut up fine and mixed with shorts, bran, cut clover hay, provender, ground oats, and table and kitchen waste with a modicum of black or red pepper dusted in. Pour boiling water over the whole, and allow it to stand until so cool that it can be held in the hand without difficulty. Feed this in a "crumbly" state and in such quantity as to barely *satisfy*, not to *gorge*. Follow this by throwing a handful of grain in the straw, or other litter on the floor, so as to start the hens scratching.

Noon.—A small quantity of grain, say oats, to be thrown in the floor litter to keep hens busy.

Afternoon.—This last daily ration must be fed before it is too dark, and should be given in such quantity as to fill the crops of the layers, for they have a long night fast before them. Wheat or buckwheat is best.

The foregoing ration ought to suit those who cannot get cut green bones. In such a case lime is best supplied in the shape of ground oyster shells, old mortar, &c.

RATION 2.

Morning.—Cut green bones in quantity of 5 lbs. to every fifteen hens. Follow as in previous ration, by throwing a little grain in the floor litter to keep hens busy.

Noon.—Scatter a little more grain to keep hens going.

Afternoon.—Send layers to roost with crops full of wheat or buckwheat.

RATION 3.

Morning.—Ground corn, ground oats, bran in proportion of 10 lbs. each ; linseed meal 1 lb. ; salt 1 oz. Mix this intimately and put 1 quart of it into a bucketful of dry cut clover hay, or any kind of cut hay and mix with boiling water. This is calculated for thirty laying hens ; enlarge to suit a greater number.

Noon.—As directed in previous rations. Keep the hens active, but do not over-feed at this time.

Afternoon.—Give a liberal grain ration, for reasons given.

RATION 4.

Morning.—Two quarts bran ; one quart middlings ; one quart cornmeal ; half pint oil meal. Mix four pounds of this with 16 lbs. small potatoes boiled and a small quantity of ground bone. Dust a little pepper in the mess. The foregoing will be enough for 100 hens.

Noon and Afternoon.—Rations as in previous ones.

RATION 5.

Morning.—Small potatoes, turnips, or other vegetables boiled and mixed with one quart of cornmeal and the same quantity of bran, to which may be added the table and kitchen waste, and a couple of handfuls of coarse sand, or fine gravel with a small quantity of ground bone. The whole fed warm for a morning ration offers variety.

Noon and Afternoon.—Rations as directed.

RATION 6.

Morning.—A correspondent gives the following in *Farm-Poultry* as a good winter egg-producing ration : 3 lbs. oatmeal, 1 lb. dried blood, 1 lb. cut green bone, 4 lbs. pea-meal, 1 quart skimmed milk. Enough for forty or fifty hens.

Noon and Afternoon.—Rations as directed.

Objection may be made to the last named, on the ground of expense, but there is plenty of room for choice in the other rations named.

* THE OTHER ESSENTIALS NECESSARY.

Green Food.—In every case vegetable or green food of some kind should be supplied. In previous reports the hanging of a cabbage from the ceiling of the hen-house to within three feet of the floor has been recommended as an excellent means of furnishing green food and exercise. And it certainly is so. Mr. D. J. Lambert, an authority on poultry matters, says :—“ Green foods, as has been often said, are too sparingly given. The majority of poultry-keepers feed too much grain. Less grain and more grass should be the watchword. Cabbage, turnips, cut clover, onions, or anything of a vegetable nature, cheapens the cost of feeding, tends to keep the fowls more healthy, and that means increased egg production, and consequently more profit.” It is a fact well known to poultrymen that hens and chickens enjoying free range will fill their crops nearly half full with grass and greens every day.

Grit is another important essential. It is actually the hen's teeth. It should be always before the fowls, and may be supplied in the shape of gravel, sifted coal ashes, crushed oyster shells, broken stone or clear grit. There are several forms of grit substances sold for use of poultrymen, all of which are good. Oyster shells are good for grit, also supplying lime for the egg shells.

Exercise is another important factor, as has been already remarked, in making hens lay in winter. To keep the hens constantly active requires skilful managing and experience. It is not so easy as may seem, at first glance. It is best secured by throwing the grain among straw, litter, or dry earth (which should be on the floor of the poultry-house) and feeding it as directed in ration No. 1. If dry earth or sand, is used on the floor instead of straw or other dry litter, the earth or sand must be raked over the grain, so as to keep the fowls busy searching for it. In report of last year a diagram of a building and shed attached for the laying stock to scratch in was given with full instructions as to the best means of keeping the laying stock in activity.

The Drink Water.—It has been urged in previous reports to have the temperature of the building, if at all possible, at such a figure (35° or 40°) that the water will not freeze. And where it does freeze the chill should be taken off before the layers are permitted to drink it. This should be done at least three or four times daily. A constant supply of pure water is an important essential.

A Comfortable House is another requisite to egg production. Experiment has proved that where the layers are kept in cold habitations, that the food instead of going into eggs will be drawn upon to supply animal heat. Experiment has also led to the conclusion that if the hens are kept comfortable at night so much the better will results be. A room with a low roof or a screen, to be let down over the roosting place at night, might utilize the warmth from the bodies of the fowls. In some recently constructed poultry-houses, the room for roosting in, and that for feeding and exercising in, are separate apartments.

THE SCIENCE OF FEEDING.

The feeding of the laying stock, so as to ensure the best results at as little cost as possible, is a science. It has to be studied, and to be successfully practised an apprenticeship has to be served, in order to gain the experience necessary. Hence you find intending poultry keepers in many cases taking positions in large poultry establishments in order to gain the knowledge or experience necessary to success. By the Experimental Farm system the best methods are found out, and the experience gained, is conveyed to the farmers in the shape of reports and bulletins, so saving time and expense. The rations may be of the very best, and the good effect lost by a lack of knowledge how to feed them properly. The experience of the past eight years leads to the endorsement of the following, "On the proper method of feeding fowls," by Mr. A. F. Hunter, one of the leading poultrymen of the day, who says in *Farm-Poultry*:—A fowl should have an empty crop in the morning and a full one at night, and she should not fill it at one or two railway-restaurant-style of feeds, but should fill it a little at a time and be kept at work all day filling it. The *work* is as essential as the food itself. Next in importance to a well balanced ration is bodily activity and that bodily activity is best promoted by keeping the hen hunting for her food." And then follows instructions as to proper feeding similar to those given in my reports of 1889, 1890 and 1891. Concluding, Mr. Hunter says:—The very best way to feed fowls in winter, is to give them for breakfast a light feed of mash (as described). An hour later scatter three or four handfuls of oats or barley, (in the straw litter) to start them scratching; about eleven o'clock three or four more handfuls of barley or oats and more scratching; about one o'clock a very light feed of wheat, to be scratched for and then enough to fill up the crop for last feed. Keep the hen a little hungry, keep her wanting just a little more, and she will work and sing and lay eggs."

The subject of rations and the proper way to feed them has been treated very fully in the foregoing pages for the reason that numerous letters have been received during the past year, as to what and how to feed and the proper quantity to give. This, not-

withstanding the information fully given in previous reports, which have been extensively circulated and read, and which doubtless goes to show the greatly increased demand there is for information on the subject.

THE EXPERIMENTAL FARM RATIONS.

WHAT WAS FED DURING THE PAST YEAR AND THE RESULT.

During the winter of 1893 beginning from the month of January, the daily rations were mixed as follows:—

Morning Rations.—Warm mash composed of ground wheat, ground barley, ground oats, ground rye &c., bran. Occasionally small potatoes were boiled, or cut clover hay steamed and mixed with the mash, so as to have variety. When cut green bones were fed for the morning ration the mash was not given.

Noon.—Light feed of oats scattered among the floor litter. Sufficient grain only to keep the layers busy.

Afternoon.—Wheat or buckwheat were given in quantity to fill the crops of the layers, and fed early enough so as to have the fowls search for it. When cut green bone was given for last ration, grain was fed afterwards to fill up the crops.

Vegetables in the shape of mangels, carrots, turnips and cabbage were all, or most of the time, before the layers, as were grit, ground oyster shells, gravel, coal ashes, &c., &c. Pure drink water and dust baths were also supplied.

THE LAYING STOCK.

The laying stock to which the above mentioned rations were fed, were composed of the following:—

	Hens.	Pullets.
Barred Plymouth Rocks.....	9	13
White ".....	..	18
Houdans.....	6	5
Silver Laced Wyandottes.....	4	6
White ".....	..	7
Langshans.....	1	8
Light Brahmas.....	9	..
White Leghorns.....	11	..
Red Caps.....	5	6
Black Minorcas.....	9	7
Langshan B., Minorca cross.....	..	10
W. Leghorn, Brahma.....	5	3
	59	83

The following were used as breeding stock, and were not supposed to be stimulated to lay:—

BREEDING STOCK.

	Hens.	Pullets.
Light Brahmas.....	5	..
Langshans.....	7	..
Andalusians.....	11	..
Black Minorcas.....	5	..
White Leghorns.....	6	..
Golden Polands.....	5	..
Coloured Dorkings.....	4	..
	43	..

COMPOSITION OF THE LAYING STOCK.

The number of layers is apparently 142, but it should be understood that among them were a number of old hens and late hatched pullets. The former would not lay as well as a hen in her prime, and the latter would be late in starting. As stated in previous reports, the old hens, particularly those of the Asiatic breeds, are not money makers during winter, for they are late in moulting, and before beginning to lay eat much of the profit they may afterwards make. The late hatched pullets become apparently stunted, for the time being, by the cold. The old hens are useful as steady sitters and careful mothers, but where reliable incubators are used, they are not required. By careful observation and calculation, there were 75 or 80 steady layers, and they gave the following number of eggs in the months named :—

January.....	777
February.....	791
March.....	1,644

PREPARING FOR SPRING.

Towards the middle of the last named month the breeding stock were mated, and by the end of the month, the eggs from them were saved for hatching purposes and sold at \$1 per setting. The combined egg yield for the following months was :—

April.....	1,939
May.....	1,650
June.....	1,066

As soon as the weather permitted, the fowls were allowed to the outside runs, where they had grass, gravel and sand.

At the end of June, the breeding season was over, and the hens were allowed to run at large in the fields in rear of the poultry houses, the male birds having been first removed from the breeding pens, and placed in pens by themselves.

TOTAL EGG YIELD FOR THE YEAR.

The total egg yield for the year, according to months, was as follows :—

January.....	777
February.....	791
March.....	1,644
April.....	1,939
May.....	1,650
June.....	1,066
July.....	941
August.....	386
September.....	236
October.....	161
November.....	114
December.....	538

SOME LESSONS FROM THE FOREGOING.

It will be noticed from the foregoing figures that during the moulting period of September, October and November, there were few eggs laid, for the reason that the hens were comparatively non-productive. During the moulting season the hens were well fed and cared for, as well as having the run of the fields. The result was the great majority of the yearling and two year old hens were in fine condition and ready for winter laying by the end of November. It should be remembered by farmers that their moulting hens require the same care as do the layers in winter. During the moulting period, the food, which at another time goes into eggs, is drawn upon to supply the rapidly growing feathers. The hen which has been a regular layer all the previous winter will take a rest during her moult and she will have well earned that rest. Another lesson to be learned is that in order to keep up the egg supply during the period

of non-production, scarcity and higher prices, that early hatched pullets are necessary. The difficulty in getting early sitters is no doubt the great drawback, but incubators are now more extensively used for the purpose, and it is only a question of time when they will be in general use.

THE BEST LAYERS.

As in previous years the Black Minorcas, Andalusians, Plymouth Rocks, Langshans, Brahas, and Wyandottes, proved themselves the best layers. The White Leghorn Brahma, and the Langshan Black Minorca crosses made excellent layers.

LARGE EGGS.

It is worthy of note that the Black Minorcas, (see fig. 1) ; Langshans, (see fig. 5) ; and Light Brahas, (see fig. 4), not only laid well during the winter, but laid very large eggs. The month of December of last year (1893), was a particularly cold one, but the breeds named did not seem to be so much affected by it as were the late hatched pullets. On the 16th January four or five dozen of Black Minorca eggs were weighed, when a number were found to go six to a pound, and all went seven to the pound. Eight dozen Brahma and Langshan eggs were also weighed, and the great majority went seven to a pound. The eggs were shown to many visitors as a sample of what could be done by the farmers of the country in supplying the demand for large eggs in any of the markets offering.

We give as follows, cuts and description of the breeds which lay large white and dark coloured eggs, and which have been tried at the Experimental Farm.

LAYERS OF LARGE WHITE EGGS.



Fig. 1.—BLACK MINORCAS.

Black Minorcas.—This is one of the leading breeds of large white egg layers, perhaps the greatest layers of large eggs known. They are rapidly taking the place of

the Black Spanish, as they are larger and hardier, the males making fair table fowls. They are good winter layers when properly housed and fed as all fowls should be. The fowls and chickens are hardy, the latter growing rapidly. Females lay 130 and 140 eggs, or more, per annum, and eggs frequently weigh 6, mostly all 7, to a pound. The standard weight of the cock must be 8 pounds; hen, $6\frac{1}{2}$ pounds; pullet, $5\frac{1}{2}$ pounds; cockerel, $6\frac{1}{2}$ pounds. The laying stock require to be kept busy in winter quarters and liberally supplied with egg shell making material. The females are non-setters. The hens of the white variety are also prolific layers.

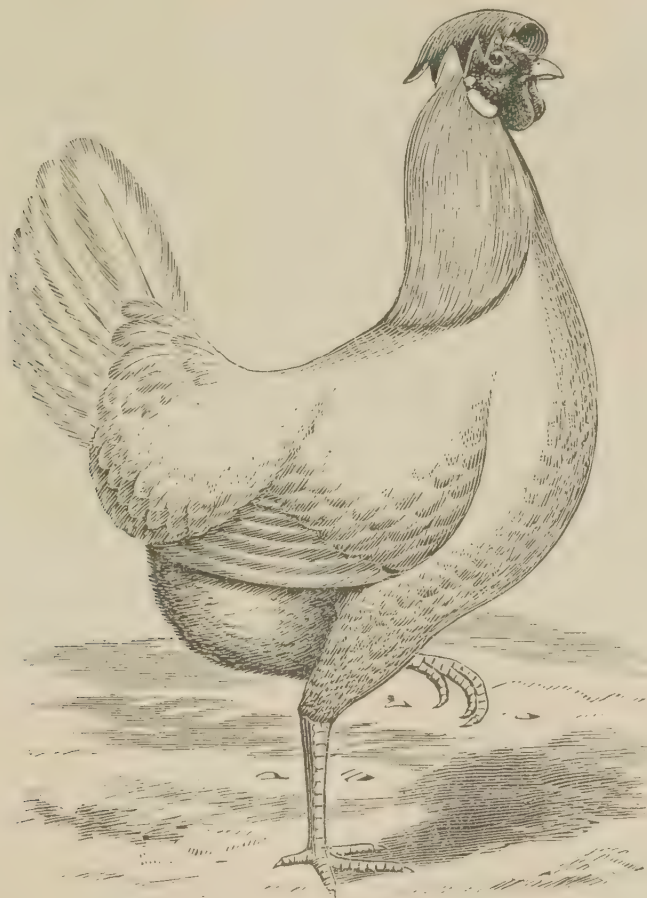


Fig. 2.—WHITE LEGHORNS.

White Leghorns.—One of the best layers at all seasons of a large white egg. Some strains lay larger eggs than others. They are non-setters, hardy, and mature rapidly, and will lay well in winter, in a moderately comfortable house. The chickens thrive well and feather quickly, and the hens lay a white egg of large size. The pullets lay at five or six months, or sooner if hatched early. The Brown and Black Leghorns are also great layers. They are good fowls for farmers when kept with a breed of sitters. They are great flyers, like all the Spanish family. There is no standard weight for this breed. The eggs from hens of a large egg laying strain weigh $2\frac{1}{4}$ ounces each; per dozen, 1 pound 10 ounces to 1 pound 11 ounces. Like the Black Minorcas, the layers require to be kept in activity and well supplied with lime to make shell.

ANDALUSIANS.

Andalusians.—Another breed of the Spanish type, and as a breed of layers rivaling the Leghorns. They are likely to occupy a high position among poultry fanciers on account of their superior laying merits. They lay well in winter, when looked after, and are hardy, quick-growing chickens. They do not breed true to colour or markings in every case; but that is a matter of secondary importance to those who wish to keep

them for their laying properties. Like the Black Spanish, they are not heavy weights, and in consequence are not so good for table use as the heavier breeds. Pullets lay when six months old. Hens lay large white eggs, the weights of which are often $2\frac{1}{4}$ ounces each, and 1 pound 11 ounces to 1 pound 13 ounces per dozen. When closely confined they require to be kept busy.



Fig. 3.—HOUDANS.

Houdans.—The females are layers of large white eggs. They do better when permitted extensive range. Chickens are hardy, grow rapidly, and are great foragers, but owing to large crest on head are apt to fall an easy prey to hawks, &c. They have the five toes of the Dorking. The cockerels are good for table use, the flesh being white and of superior quality. They often make 1 pound per month in weight. Hens' eggs weigh $2\frac{1}{4}$ ounces each and a little more when fowls have unlimited run; per dozen, 1 pound 12 ounces to 1 pound 15 ounces. The standard calls for the following weights:—Cock, 7 pounds; hen, 6 pounds; cockerel, 6 pounds; pullet, 5 pounds. The females are non-sitters.

Other Breeds.—The following breeds which have not been tried at the Experimental Farm lay large white eggs:—Black Spanish and White Crested Black Polish.

LAYERS OF DARK OR BROWN COLOURED EGGS.

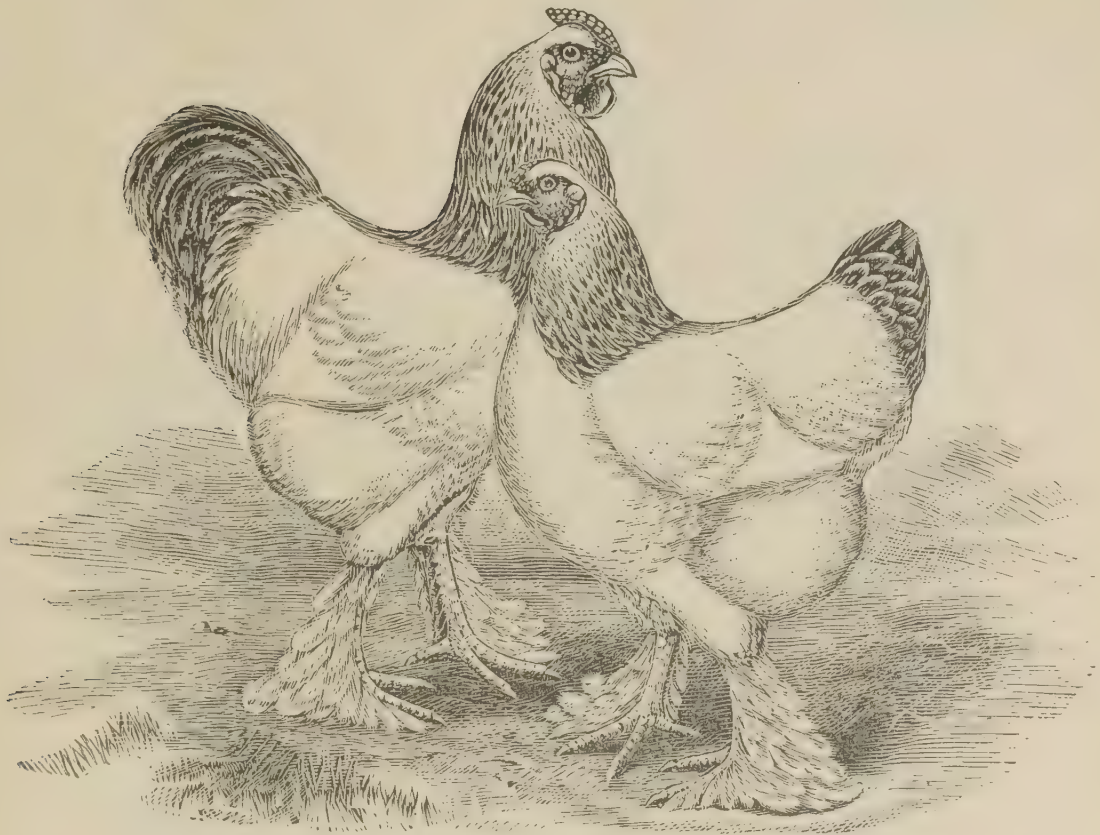


Fig. 4.—LIGHT BRAHMAS.

Light Brahmas.—There are layers of large richly coloured eggs. They are a well known and old established breed, with many friends and admirers, and grow to a large size and heavy weight, but take time to do so. They have large frames, and a good deal of feed is required to put flesh on them, but they are very hardy, both as chickens and fowls. They are quiet and bear confinement well. Females are fair layers of eggs of good size, but rather heavy for early sitters (when egg-shells are likely to be thin), and apt to be clumsy as mothers. After seven or eight months of age the males make good table fowls. The pullets lay at about seven months of age. The laying stock in winter quarters must be kept in exercise, and must not be overfed or they will become too fat to lay. Hens' eggs weigh $2\frac{1}{4}$ ounces to $2\frac{1}{2}$ ounces each; per dozen, 1 pound 12 ounces to 1 pound 13 ounces. The weights demanded by the standard are: cock, 12 pounds; hen, $9\frac{1}{2}$ pounds; cockerel, 10 pounds; pullet, 8 pounds. They are classified as Asiatics. The Dark Brahmas are also a meritorious variety.

Langshans.—These are a favourite breed of great merit, and are classed as Asiatics. The hens lay a large egg of a rich brown colour, and many of them. Some eggs laid by Langshan hens in the poultry department of the Central Experimental Farm during last winter weighed 7 to 1 pound. The cockerels put on flesh at the rate of 1



Fig. 5.—LANGSHANS.

pound per month, and as their flesh is very white they make good market chickens. Both fowls and chickens are very hardy. The standard weights are : cock, $9\frac{1}{2}$ pounds ; hen, 7 pounds ; cockerel, 8 pounds ; pullet, 6 pounds. Some of the male birds grow to a large size, and weigh between 11 and 12 pounds.

Buff Cochins.—This is another of the Asiatic breeds with a large number of friends. Some strains lay much larger eggs than others. Like all the other breeds of this class, they require to be kept active when in close confinement. The eggs from the hens of some strains weigh $2\frac{1}{4}$ ounces each, but all are of a rich dark colour. The chickens are hardy and grow well, showing about the same development as those of the Light Brahmas. The standard weights are : cock, 11 pounds ; hen, $8\frac{1}{2}$ pounds ; cockerel, 9 pounds ; pullet, 7 pounds. The other varieties of this breed are White, Black and

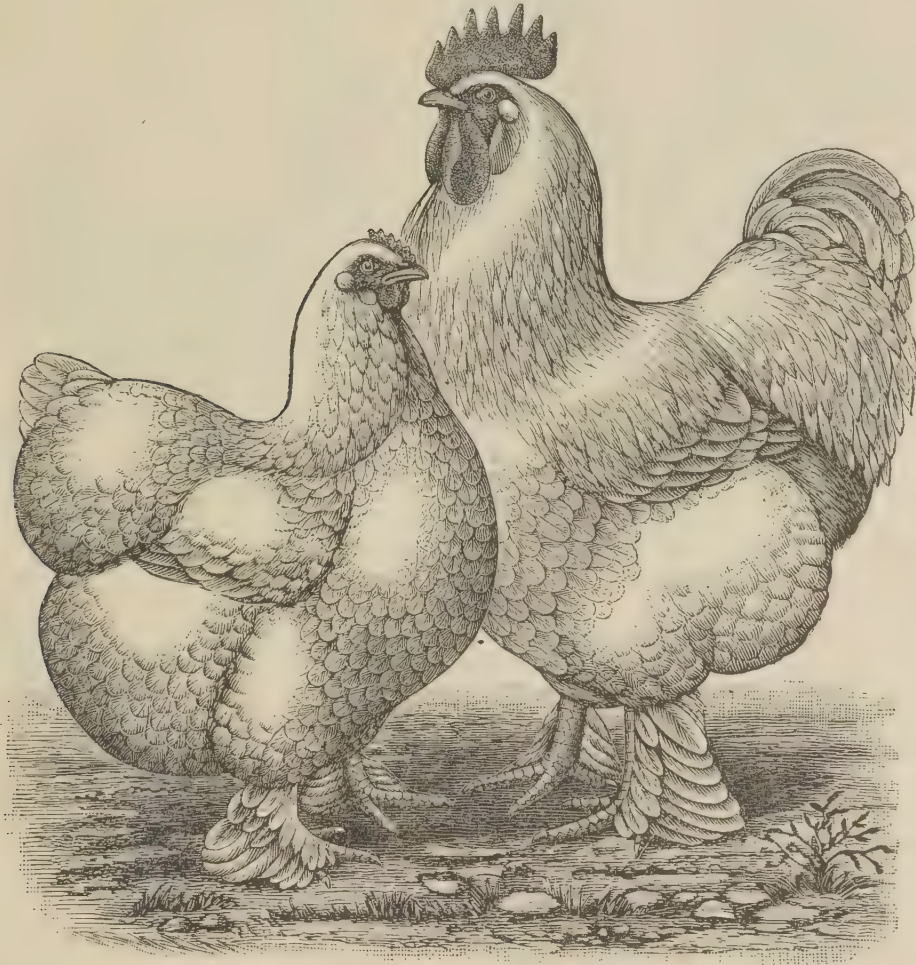


FIG. 6.—BUFF COCHINS.

Partridge Cochins, the characteristics of which are about the same as the Buff. The cockerels put on flesh at the rate of about 1 pound per month after first month. The pullets lay at about seven months of age. These are perhaps a little slow for farmers, but may make a good cross. They are not now kept at the Experimental Farm for the reason that they have not been profitable as layers.

Other Breeds.—The following breeds not yet tried at the Experimental Farm are also layers of large dark eggs. Black Cochins, Partridge Cochins, and White Cochins.

BREEDS GOOD FOR EGGS AND MARKET:



FIG. 7.—BARRED PLYMOUTH ROCKS.

Barred Plymouth Rocks.—This breed is one of the most popular on the continent as an all round fowl for the farmer, and deservedly so. The females mature quickly and lay well in winter, with moderate protection and proper feeding. The eggs are not quite so large as those of the Minorca or Brahma, although of good marketable size for home and United States markets. Some strains lay larger eggs than others. The chickens are hardy and vigorous. The cockerels have put on more flesh per month, with the same rations, than any others tried at the Central Experimental Farm in six years. After the first month or six weeks the cockerels, with proper care and pushing, ought and will put on flesh at the rate of one pound and a quarter per month. A farmer ought, with a little trouble, to be able to put on the market Plymouth Rock cockerels weighing eight pounds per pair, or four pounds each, at the end of four months. What an improvement there would be in the weight and quality of the chickens sold on the markets of the cities if the majority of farmers bred Plymouth Rocks instead of the “scrubs” usually seen about the barnyards? There are three varieties of this popular breed, viz., the Barred, White and Buff. The latter is a new comer.

White Plymouth Rocks.—This is a variety lately introduced but equally popular. All the good points of the latter are claimed for these new comers, with the addition of greater size and whiter appearance of flesh, owing to the absence of the dark pin feathers. They are hardy, rapid growers as chickens, and the pullets are excellent

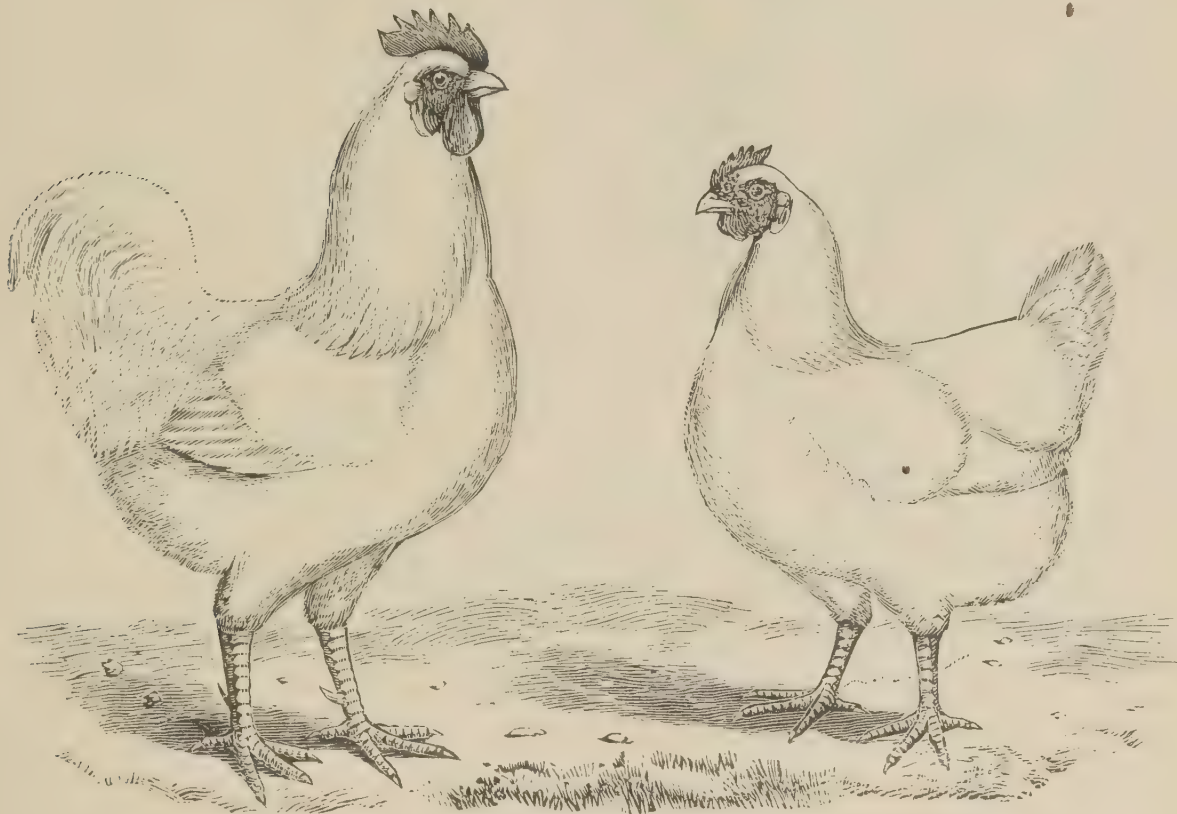


FIG. 8.—WHITE PLYMOUTH ROCKS.

layers. At the Experimental Farm last summer (1893) a cockerel hatched on the 21st May weighed six pounds on the 21st September following. The pullets made large and handsome fowls by the middle of winter, and began to lay in six months. The standard calls for the following weights, viz.: cock, $9\frac{1}{2}$ pounds; hen, $7\frac{1}{2}$ pounds; cockerel, 8 pounds; pullet, 6 pounds.

White Wyandottes.—This is a very promising variety of this popular breed. They have all the good points of the Silver Laced, with the advantage of dressing better for market on account of the white pin feathers not showing so darkly as in the case of the



FIG. 9.—WHITE WYANDOTTES.

Silver Laced or Golden varieties. The chicks are hardy and grow well. The pullets begin to lay at five and a half to six months, and are good layers of a medium sized egg. The cockerels mature early and make good market chickens. A cockerel hatched on 30th May, weighed on 2nd October following 4 pounds.

DORKINGS.

Dorkings.—The Dorkings are, perhaps, one of the best known and appreciated breeds extant, on account of their superior table qualities. They are a breed that should be sought for by all who wish to put fowls of superior flesh properties on the market. There are three varieties in this country, viz., the Coloured, Silver Gray and White. These all possess the same excellent qualities for the table, and the females are fair layers of an egg of good size. Mr. Allan Bogue, the well known poultry breeder of London, Ont., speaks very highly of them, and says they ought to be much more extensively bred for market.

HOW BREEDING PENS WERE MADE UP.

About the first and second weeks of March the different breeds mentioned were mated as follows :—

Breeds.	How Mated.		Remarks.
Brahmas....	1 cock.....	9 hens.....	Early eggs not very fertile.
Langshans	1 “	5 “	“
B. P. Rocks	1 “	11 “	Fairly fertile from first mating.
White “	1 “	11 pullets	Eggs remarkably fertile from first.
Black Minorcas.....	1 cockerel....	9 hens	Satisfactorily fertile.
White Leghorns	1 cock	11 “	Hens old. Results satisfactory when hens ran out.
Andalusians	1 “	11 “	Satisfactory.
White Wyandottes....	1 cockerel....	7 pullets	Average.
Silver “	1 cock.....	9 hens.....	Satisfactory.
Golden Polands.....	1 “	7 “	“
<i>Crosses.</i>			
Indian Game—Brahma..	1 “	3 “	Very good.
“ —Dorking..	1 “	2 “	“
P. Rock — “ ..	1 “	2 “	“

It is worth noting that the eggs of the White Plymouth Rocks were remarkably fertile from the beginning of the hatching season, notwithstanding the fact that they were pullets and had laid well all winter. This satisfactory result was no doubt owing to the male bird being kept in a separate pen all winter, and to the fowls coming out of the winter in vigorous health. There is an important lesson, in this experience, to all poultry breeders. The early eggs of the Brahmas and Langshans were not as fertile as could be desired, and were not so, doubtless, on account of the hens becoming a little too fat, and to the fact that some of the hens, used as breeding stock, had been good layers during the winter. The run outside soon made an improvement.

The demand for eggs for hatching was very great, and many orders received late, could not be filled. It was gratifying to note the increased inquiry for eggs from farmers, who preferred, in most cases, the Plymouth Rock varieties.

The following were the hatching results :—

EGGS SET AND CHICKENS HATCHED.

When Set.		Description of Eggs.	When Hatched.	Number of Chickens.
April	3.....	13 White P. Rock.....	April 24.....	9
“	3.....	13 Langshan	“ 24.....	6
“	3.....	13 W. P. Rocks.....	“ 24.....	10
“	13.....	13 B. P.....	May 4.....	7
“	26.....	13 S. L. Wyandottes	“ 17.....	8
“	26.....	13 Andalusian	“ 17.....	13
“	26.....	13 “	“ 17.....	7
“	26.....	13 B. Minorcas	“ 17.....	12
“	26.....	13 Brahmas.....	“ 17.....	6
May	2.....	11 “	“ 23.....	3
“	2.....	13 B. Minorcas.....	“ 23.....	12
“	7.....	13 “	“ 28.....	8
“	7.....	13 White Leghorn.....	“ 28.....	10
“	12.....	13 B. Minorca.....	June 2.....	9
“	12.....	13 Crosses	“ 2.....	9
“	12.....	13 “	“ 2.....	4
“	17.....	13 B. Minorcas.....	“ 7.....	10
“	17.....	13 White Wyandottes.....	“ 7.....	5
“	17.....	13 P. Rocks.....	“ 7.....	7
June	24.....	13 Crosses.....	July 15.....	7
“	30.....	13 White Leghorns	“ 20.....	5
Total.....				167

It will be seen from the above that the eggs from the pen of Black Minorca hens hatched remarkably well. Two settings of 13 each gave 24 chicks, and out of 65 eggs 51 chicks were hatched. Their growth was most satisfactory.

GROWTH AND DEVELOPMENT OF CHICKS.

As soon as they were fit, the young chicks and their mothers were placed in small coops, in the grass of the fields, the latter being surrounded by wire netting. New ground was used during the season, and the good effect was visible in the healthy and vigorous growth of the chickens. As in the past seven years, the first food of the newly hatched chickens was stale bread soaked in milk, squeezed dry, and so fed. No food has been found equal to this for putting the chicks on their feet. In a day or two granulated oatmeal was given with the former ration, and this was followed by a mash made of boiled skimmed or sweet milk, mixed into sufficient quantities of cornmeal, shorts, bran and crusts of bread. A little finely cut green bone was also fed. After fourteen days wheat was given in small quantities at first. The chicks were always sent to brood at night with their crops full. If rapid and satisfactory flesh development is aimed at, it is peremptory that the young birds be attended to early and late. It is to be borne in mind that a chicken neglected in the first five weeks of its existence will never make a large bird for market, nor an early layer, if a pullet. To make weighty birds for market, fine birds for the show pen or early laying females, the youngsters must be carefully and steadily pushed from time of hatching, whether by hen or artificial incubator. There can be no getting out of this.

The development of the chickens was much the same as in previous years, the White and Barred Plymouth Rocks taking the lead with a development of one pound per month, without any forcing beyond regular feeding and care, but no more than every chicken should receive. The following table of progress may be interesting, viz. :

Barred P. Rock Cockerel, hatched 24th April ; on 24th August, weighed 4 lbs. 11½ oz.

Langshan Cockerel, hatched 24th April ; on 24th August, weighed 3 lbs. 11 oz.

White P. Rocks showed a gain of 13 to 16 oz. per month.

If the above birds had been caught, penned up and fattened previous to being weighed, they would, of course, have shown greater gain.

THE CROSSES MADE AND HOW THEY TURNED OUT.

The following crosses were made:—Indian game, male ; Light Brahma, female. Indian game, male ; Coloured Dorking, female. Plymouth Rock, male ; Coloured Dorking, female. White Leghorn, male ; Barred P. Rock, female.

There was, unfortunately, only one cockerel of the Plymouth Rock—Coloured Dorking cross, and his progress was certainly very satisfactory, and if it can be taken as a criterion, shows the cross to be well adapted for the making of heavy market chickens. Hatched on the 15th April, it weighed on 20th June, following, 2 lbs. 2 oz ; on 15th July, 3 lbs. 7½ oz. ; on 17th August, 5 lbs. 5 oz. A gain of 5 lbs. 5 oz. in four months, without special feeding, is much above the development of the average market chicken. It is the intention to try more of this cross early next season, so as to give opportunity for good growth before the hot season.

The White Plymouth Rock—White Leghorn cross chickens turned out to be pullets, with one exception. Hatched on the 15th July, the cockerel weighed on the 26th December, 4 lbs. 11 oz. The pullets are well developed and vigorous, and promise to make fine fowls.

The Indian Game—Coloured Dorking cross made very handsome heavy pullets, tightly feathered, with compact body and shape of the Indian Game. One of the pullets which was hatched on the 2nd June, weighed on the 26th December, 5 lbs. 4 oz. A cockerel of the same cross hatched on the same day, weighed 5 lbs. 11 oz. on 26th December.

The Indian Game—Light Brahma cross. A cockerel hatched on the 2nd June, weighed on 26th December, 5 lbs. 11 oz., the same weight as the cockerel of the previous cross, at the same age. The pullets are not so compact in shape or form as those of the Dorking cross.

The Langshan—Black Minorca cross pullets, which were hatched last year (1893), have turned out magnificent—large, dark fowls, some showing more of the Langshan type, and others showing more of the Black Minorca in shape and size. They lay a large deeply coloured (Langshan) egg, of most inviting appearance.

The cross of the White Leghorn—Brahma, which was also made last year, has produced fairly large fowls and prolific layers of eggs of medium size. Both males and females were slightly feathered on the legs. Some were more so than others.

STRAW VERSUS SAND ON FLOOR.

Careful observation leads to the conclusion that while the sand floor tends to make the conditions more natural, the layers dusting freely in it, that the straw-littered floor is a better incentive to exercise, the fowls searching longer for the grain scattered in it. Large dust baths were provided for the latter pens.

INCUBATOR TRIAL.

In the early part of March a hot water incubator of 100-egg capacity, with brooder, was purchased from Mr. Gagné, of Quebec. The machine was placed in one of the poultry houses, but the hatching results were not satisfactory, owing to variations of temperature in the building. Another trial will be made in a more suitable location. From the number of letters received on the subject, from farmers and poultry dealers, there can be no doubt that greater interest is being taken, every year, in artificial incubation, and a great incentive to trial and investigation, in the eastern part of the country, has been an admirable work on the subject by Mr. Charles A. Cyphers, of Boston U. S. A.

DISEASES OF POULTRY.

Numerous letters were received during the year, describing diseases which had affected poultry in different portions of the Dominion. The most important cases are noted as follows:—

TURKEYS AFFECTED WITH ROUP.

“MOOSE JAW, 24th October, 1894.

“DEAR SIR,—I have some turkeys which are dying. Some have lost the use of their legs, while others have swollen heads.

(Sd.) “ROBERT MOORE.”

In response to the above, Mr. Moore was informed that his birds with the swollen heads had roup of a pronounced and fatal type. He was advised to at once remove the sick from the well, and to pour turpentine or coal oil—preference given to the former—over the heads and eyes, letting the liquid into the eyes of the sick birds. If roup pills were at hand, to give one night and morning. If not to give a hot mash of shorts and cornmeal, or stale bread soaked in milk with ginger or Cayenne pepper mixed. The house in which the sick birds were, would have to be thoroughly disinfected.

As roup is not unfrequent among turkeys, Mr. Moore's letter was sent to Mr. U. Bonneville, of Danville, P.Q., who has a long experience with turkeys, and who at once replied: “I think your advice to Mr. Moore as good as can be given. I would only add, that in similar cases I use a solution of vitriol—either white or blue—in the proportion of a tea-spoonful to three half pints of water, and with the mixture syringe the

nostrils and slit in the roof of the mouth. Another remedy is sweet oil, 1 oz. ; camphor (pulverized), 1 drachm ; carbolic acid, 12 drops ; mix and inject in nostrils and roof of mouth, twice daily. When the swelling is large and advanced, I lance the part that is most prominent, generally in front of the eyes, in order to get rid of the accumulated matter. I then burn the cut with caustic, in order to prevent its healing too quickly, and inject into the cut the vitriol mixture twice daily. I have never had a case of weakness in legs. Signed, U. BONNEVILLE."

FATAL RESULTS CAUSED BY FILTHY WATER.

In November, 1893, Mr. M. Cowley wrote that a disease was carrying off a large number of his fowls. The fowls first went lame, their combs wilted, and after hobbling about—going from bad to worse—for a month or five weeks, they died. Upon examination, the livers in most cases were found ulcerated, while in others they looked as if covered with hayseed. All information possible was given. A description of the ailment was published in report of last year, and excited great interest, one gentleman writing from British Columbia, that his fowls were similarly affected. A fowl which had died from the disease, was sent to Prof. Wesley Mills, of McGill University, for examination, but no satisfactory results were obtained. Two sick fowls were later sent to the Experimental Farm poultry house, and were put in the hospital for observation, but got better. During the latter part of last summer, a letter was received from Mr. Cowley, saying that his fowls continued to die. He was advised to try camphor in some shape in the event of the ailment being acute dysentery or cholera. On the 10th (December) instant, a letter was received from Mr. Cowley, saying "that since the cold weather had set in, and by the use of considerable alum in the drink water, the fowls had got better. He was positive that the trouble was caused by the fowls drinking manure water from the barn. He had built a new place, and at time of writing there was not the slightest sign of disease."

There can be no doubt that the filthy water was the cause of the trouble. The ailment ceased when the fowls were removed from the source of it.

VERY LIKE ACUTE INDIGESTION.

On 8th November last, the following letter was received:—

"VANKLEEK HILL, 7th November, 1894.

"DEAR SIR,—We have disease among our chickens. The combs of the sick turn black, and death is quick. The crops seem full of undigested grain. We lose five or six every day. I have a flock of eighty extra fine Bronze turkeys, and I would not like to lose any of them. The old fowls do not seem to take it. Signed, JOHN M. BARTON."

Mr. Barton was written to, and asked to give further particulars as to diet, how housed, &c., and told that the case from description seemed to be one of acute indigestion. A reply was received that the food had been wheat broken up, boiled potatoes and provender, and a little corn. The house had four compartments. Some Leghorns away from the rest had got the disease. Mr. Barton inclosed a clipping from an agricultural paper on "Black Head," by H. S. Babcock, the well-known writer on poultry subjects. Mr. Babcock was immediately written to, and the clipping and Mr. Barton's letters inclosed to him. As the case was an important one, it may be advisable to give Mr. Babcock's letter, as follows:—

"PROVIDENCE, R.I., U. S. A., 16th November, 1894.

"DEAR SIR,—From the incomplete statement of symptoms of disease affecting Mr. Barton's fowls, it is hard to state decisively what it is. I suspect from the rapid action of the ailment and the few symptoms given, that it is acute indigestion or cholera. If it were cholera, there would be likelihood of the old fowls taking it. The black head

is a disease due to some micro-organism, which affects turkeys, but which so far has not affected fowls in this part of the country, though it is possible that its ravages are not confined to turkeys. This disease is now under investigation by the officials of the United States government. The comb turning black is not the symptom of a single disease, but of many. It occurs in roup, cholera, indigestion, canker, strangulation, &c. The presence of undigested grain in the crops, indicates some disarrangement of the digestive organs.

“Yours truly,

(Sd.) “H. S. BABCOCK.”

Mr. Babcock's reply was immediately sent to Mr. Barton, and at the same time he was advised to give his chickens some reliable condition powder, as a tonic, in their soft feed.

On the 23rd November, a reply was received from Mr. Barton, saying that his chickens were better, since the cold weather had set in. He had lost none since the 12th instant. If the disease again broke out, he would report at once.

FILTHY DRINK WATER.

One or two cases were reported in which the trouble was, no doubt, caused by the poultry having none other but filthy water to drink. In most suspected cholera cases, the acute symptoms are produced by foul drink water or food, and not unfrequently both.

OTHER CASES.

There were numerous inquiries as to a cure for colds, catarrh and roup. The latter is often the result of a neglected cold. When taken at its first appearance, cold can be cured by the removal of the ailing fowl to dry quarters, and the use of a good condition powder—in a soft mash—which should be given once a day at any rate. It is better to kill a fowl with pronounced symptoms of roup, for it is only a source of infection or contagion, and should it be cured, is never fit to breed from. A poultry keeper with a flock of good layers cannot be too careful in the introduction of new birds, as disease is frequently so brought by sickly new comers. It is always best to quarantine new purchases for some days, or until assured of their sound condition.

A SIMPLE CURE FOR ROUP.

Mr. E. H. Sanders, of Watford, gives the following in a letter as a quick and sure remedy for roup or cold, and it certainly has the merit of simplicity. He says: “I bruise onions to a pulp, and then squeeze out the juice. With a syringe I force the juice into the nostrils and into the throat three times daily. I also make a pill of equal parts of the pulp and bread, and give to the sick fowl. Three or four days of this treatment will prove a sure cure.”

MISCELLANEOUS.

AN INTERESTING EXPERIMENT.

At the request of Dr. Jenkins, of Charlottetown, P.E.I., an experiment was made to ascertain the difference, if any, in the weight of eggs at the time of setting under the hen, and at the period of hatching out. For this purpose a certain number of Black Minorca eggs and Indian Game—Brahma cross eggs were selected and marked as below.

The weights were taken at both periods by Mr. F. T. Shutt, M.A., chemist to the Experimental Farms, who gives the result as follows :—

LOSS IN WEIGHT OF EGGS DURING INCUBATION.

		Weight at time of Setting.	Weight after 21 Days.	Per centage of Loss.
		Grammes.	Grammes.	
Black Minorca.....	A	60·35	51·15	15·0
do	B	67·50	56·75	15·9
do	C	59·75	51·35	14·6
do	D	66·70	54·90	17·7
do	E	63·70	54·42	14·6
do	F	55·80	.....	.....
do	G	65·80	53·25	19·0
do	H	57·80	50·30	13·0
Average .....		.....	.....	15·7
Game—Brahma Cross.....	A	62·60	.....	.....
do	B	60·40	53·80	10·9
do	C	65·50	58·30	11·0
do	D	55·50	48·50	12·6
do	E	56·75	50·70	10·6
do	F	67·10	61·20	8·8
do	G	55·61	49·20	11·6
do	H	64·35	57·70	10·3
Average.....		.....	.....	10·8

PEKIN AND AYLESBURY DUCKS.

During the early part of the month of March, a drake and four ducks of the Pekin breed, and a drake and a like number of ducks of the Aylesbury breed were purchased and arrived during the third week of the month. They were placed in pens in No. 3 house, and were allowed outside run as soon as the weather permitted. Subsequently they were removed to pens with tanks, to which water was supplied by means of pipes. Both breeds laid fairly well, when one of the Pekin ducks became lame, and was soon after followed by another of the same breed with similar lameness. Both recovered, but were subsequently attacked with the same symptoms and died. Death was apparently from paralysis of the limbs and certain parts of the body. The drake and another duck also died during the summer from apparently the same cause, The Aylesbury ducks in the next pen displayed vigorous health from beginning to end of the season, and are apparently in fine condition at the date of writing. The conditions as to feed, care and treatment were the same in both cases. In both runs were grass, gravel, sand and water tank. Mr. John White, of the Canada Atlantic Railway, Ottawa station ticket office, reported the death of nineteen ducks from a disease with identically the same symptoms.

COMMENCEMENT OF WINTER LAYING.

Winter laying commenced at the end of November, by which time the hens were over their moult and in fine condition. The yearling hens of the Black Minorcas and White Plymouth Rock breeds were first to begin to lay.

PURCHASE OF NEW STOCK.

During the latter part of November, the following new stock was purchased—in most cases—to replace old stock, the object being to have as many pullets for laying

stock as circumstances would permit. The fowls arrived during the first week in December, and were as follows :—

11	Coloured Dorking pullets.	
11	White Leghorn	do
7	Barred Plymouth Rock pullets.	
7	Langshan	do
11	White Minorca	do
4	Silver Laced Wyandotte	do
4	White Java	do and
1	Cockerel.	

Pullets of our own hatching made up the number to eleven in the case of the breeds designated, making the laying stock in No. 1 house, as follows :—

NORTH WING.

Pen No. 1—	11	Silver Laced Wyandotte pullets.	
do	2—	11	Barred Plymouth Rock do
do	3—	11	White do do yearling hens.
do	4—	11	Langshan pullets.
do	5—	11	L. Brahma hens, three years old.

SOUTH WING.

Pen No. 1—	11	White Leghorn pullets.
do	2—	11 Black Minorca yearling hens.
do	3—	11 White do pullets.
do	4—	11 Andalusians, 7 yearling hens, 4 pullets.
do	5—	11 Coloured Dorking pullets.

The above are all birds of the first quality, and already some of the White Leghorn, White Minorca and Langshan pullets are laying, and others will soon follow.

The White Javas, with other stock, are in No. 3 house, and began to lay a few days after arrival.

In the south wing of No. 1 house, the laying stock are in pens, on the floors of which sand to the depth of 4 inches has been placed. On the floors of the pens in the north wing of the same house, straw has been put. Observations as to which is the most suitable will be continued. With the exception of the difference in the material on the floors of the pens, the conditions as to temperature, food, and care are the same, and the results to be learned from so many of the different popular breeds side by side cannot fail to be valuable, as they will be interesting.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

REPORT OF WM. M. BLAIR, *Superintendent.*

NAPPAN, N.S., 15th December, 1894.

To WILLIAM SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the following report of the operations on the Experimental Farm for the Maritime Provinces at Nappan, N.S., during the year 1894.

WEATHER.

Snow fell on 6th November, 1893, and remained until the middle of April, 1894, a very unusual thing in Nova Scotia, the ground being only slightly frozen when the snow fell, the frost did not penetrate deep into the soil, except where the snow was tramped, the result being that potatoes and turnips which happened to remain in the ground all winter grew in the spring. Nevertheless we had very severe frost on several occasions. On 6th February it was 20° below zero; on the 13th, 13°, 14th, 27°, 24th, 10°, and on the 25th 13° below zero.

Farm work commenced on 28th April, and continued with little interruption until all the seed was sown. The weather was all that could be desired until 11th July, when we had a good rain, the last of any account until 17th September. In consequence of this long period of drought all crops suffered very much, reducing the average, excepting the hay, which was well matured at this time and yielded well. Grain was about two-thirds of an average crop; roots about the same. The trees and shrubs planted on the farm felt the effects of the drought very much, and although watered frequently, some of them died. Springs dried up and cattle suffered both for want of food and water.

Both hay and grain were harvested in fine condition, the grain being well filled and heavy.

MANURES,

In addition to the barn-yard manures which, in our experience, excel all other fertilizers, if properly cared for, some special manures were used, such as superphosphates and bone meal. In consequence of the annual application of more or less of such material and the extension of the system of drainage, the farm is gradually increasing in fertility and becoming better suited to carry on experimental work.

HAY.

The hay was more than an average crop on both marsh and upland—23 acres of upland gave 57 loads; 27 acres of marsh gave 55 loads; 15 acres of broad leaf gave 19 loads, or in all 131 loads, averaging 2,200 pounds per load, making 144 tons, all of which was secured in excellent condition.

SPRING WHEAT.

Thirty varieties of wheat were sown in plots of one-twentieth acre each on clayey loam soil.

The crop being more or less affected with red rust or leaf blight was not quite up to the average, although the kernels were plump and heavy, and of a good quality ; the straw was stiff, but all more or less rusted.

The following table gives yield per acre, character of the different varieties, &c. The soil was clay loam, and the seed was sown at the rate of 1½ bushels per acre. The land was in roots in 1893 :—

SPRING WHEAT—Test of varieties.

Name of variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		Inches.		Bus. lbs.	lbs.	
Dion's.	May 8	Sept. 3	118	46	Stiff.....	3 to 3½	Bearded..	29 40	58½	Very slightly.
Stanley	" 8	Aug. 22	106	38	"	3	Beardless.	25 20	62	"
Great Western.....	" 8	" 31	115	44	"	3 to 3½	Bearded..	25 00	60	Slightly.
Abundance.....	" 8	" 23	107	43	"	2½ to 3	"	24 40	60	Badly.
Red Fife	" 8	" 30	114	41	"	2½ to 3	Beardless.	24 00	60	Very slightly.
Red Fern	" 8	Sept. 1	116	38	"	2½ to 3	Bearded..	23 00	62½	Considerably.
Campbell's White Chaff	" 8	Aug. 23	107	34	"	2 to 2½	Beardless.	22 20	61	Badly.
Preston.....	" 8	" 30	114	38	"	3½ to 4	Bearded..	21 20	61	Slightly.
Percy	" 8	" 29	113	45	"	2½ to 3	Beardless.	21 20	62	Very slightly.
Prince.....	" 8	" 22	106	39	"	3	Bearded..	20 40	60½	Badly.
Beta	" 8	" 23	107	39	"	2½ to 2¾	"	20 00	61½	"
Rio Grande.....	" 8	" 31	115	43	"	3½ to 3¾	"	20 00	60½	Slightly.
Alpha.....	" 8	" 30	114	39	"	2½ to 3	Beardless.	20 00	61	"
White Connell	" 8	" 31	115	41	"	2½ to 2¾	"	20 00	61	Very slightly.
Hungarian Mountain.	" 8	Sept. 1	116	40	"	2½ to 3½	"	19 40	61½	Slightly.
Herisson Bearded....	" 8	Aug. 26	110	40	Medium ..	1½ to 2	Bearded..	19 40	62	Very slightly.
Ladoga.....	" 8	" 21	105	40	Stiff.....	2½	"	19 00	60½	Badly.
Defiance.....	" 8	Sept. 3	118	38	Medium ..	3 to 3½	Beardless.	18 40	61	Very slightly.
Albert.....	" 8	Aug. 23	107	39	Stiff.....	2½ to 3	Bearded..	18 10	60	Slightly.
Pringle's Champlain...	" 8	" 23	107	36	"	3 to 3½	"	18 00	59	"
White Fife	" 8	Sept. 3	118	38	"	2 to 2½	Beardless.	17 20	59	Badly.
Black Sea.....	" 8	Aug. 23	107	39	"	2½	Bearded..	16 40	60	"
Carleton.....	" 8	" 23	107	43	"	3 to 3½	"	16 40	60½	Considerably.
Crown.....	" 8	" 28	112	39	"	2¾ to 3	"	16 40	61	Slightly.
Colorado.....	" 8	" 21	105	42	"	2½ to 3	"	16 20	59	Very slightly.
Wellman's Fife.....	" 8	Sept. 3	117	42	Medium ..	3 to 3½	Beardless.	15 40	....	"
Advance.....	" 8	Aug. 23	107	39	Stiff.....	3	Bearded..	15 00	59½	"
Ottawa.....	" 8	" 22	106	40	"	2½ to 3	"	15 00	60	Considerably.
Hueston.....	" 8	" 31	115	39	"	3	Beardless.	15 00	56	Slightly.
Glengarry (D. Fraser).	" 8	Sept. 4	119	40	"	3½ to 4	"	10 00	54	Very badly.

NOTE.—The weights per bushel given here, and also in all other grain tables in this report, were taken from the grain as it came from the threshing mill, and are not the maximum weights that the grain could be brought to by cleaning.

CROSS-BRED WHEATS.

Some new varieties of cross-bred wheat were sown, the yield per acre was large and the kernels were well filled. These seem to be very promising varieties of grain. They were sown on clay loam on land which grew roots in 1893 in $\frac{1}{20}$ acre plots at the rate of $1\frac{3}{4}$ bushels per acre. The following table gives the results :—

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				Inc.		Inches.		Bush. lbs.	Lbs.	
<i>Huron.</i> Ladoga female with White Fife male.....	May 9	Aug. 31	114	42	Stiff	3 to 3 $\frac{1}{2}$	Bearded	27 ..	61	Slightly.
<i>C—1888.</i> Ladoga female with White Fife male.....	" 9	Sept. 1	115	38	"	3 to 3 $\frac{1}{2}$	Beardless	26 20	62	"
<i>C—No. 2, sport.</i> Ladoga female with White Fife male.....	" 9	Aug. 30	113	42	"	2 $\frac{3}{4}$ to 3	Beardless	26 ..	62	"
<i>Blenheim.</i> Ladoga female with White Fife male.....	" 9	Aug. 31	114	45	"	3 to 3 $\frac{1}{2}$	Bearded	20 ..	59 $\frac{1}{2}$	"

EXPERIMENTS WITH BARLEY.

Thirteen varieties of two-rowed and twelve varieties of six-rowed barleys were tested, these were sown on 9th May in $\frac{1}{20}$ acre plots on clayey loam soil, at the rate of two bushels per acre, the previous crop being roots.

The two-rowed sorts seemed more affected with the red rust than the six-rowed. The heads did not fill out well towards the tip, and many of the kernels were completely dried up, those that matured became very plump and gave good weight per bushel. The accompanying table gives comparative earliness, character of growth and yield per acre :—

SIX-ROWED BARLEY—Test of varieties.

Name of variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				Inches.		Inches.	Bus. lbs.	Lbs	
Royal.....	May 9	Aug. 11	94	34 to 37	Stiff	2 to 2 $\frac{1}{2}$	37 24	50	Very slightly.
Mensury.....	" 9	" 9	92	36 to 44	"	2 to 3	34 8	48	"
Phoenix.....	" 9	" 13	96	30 to 34	"	2 to 2 $\frac{3}{4}$	32 4	50	"
Petschora.....	" 9	" 9	92	32 to 40	Medium...	2 $\frac{1}{2}$ to 3	31 32	47 $\frac{1}{2}$	Slightly.
Odessa	" 9	" 10	93	35 to 40	Stiff	1 $\frac{3}{4}$ to 2 $\frac{1}{2}$	31 12	48	Very slightly.
Oderbruch.....	" 9	" 13	96	30 to 32	Medium...	1 $\frac{3}{4}$ to 2 $\frac{1}{2}$	30 20	53	"
Summit	" 9	" 13	96	34 to 37	Stiff	2 to 2 $\frac{1}{2}$	28 36	52	"
Trooper	" 9	" 15	98	29 to 32	"	2 to 2 $\frac{1}{2}$	26 12	49	"
Rennie's Improved.....	" 9	" 13	96	33 to 39	"	1 $\frac{3}{4}$ to 2 $\frac{1}{4}$	26 12	51	"
Surprise.....	" 9	" 15	98	36 to 40	"	2 $\frac{1}{2}$ to 3	25 20	53	"
Baxter's.....	" 9	" 13	96	30 to 34	Weak	2 to 2 $\frac{1}{2}$	24 8	52 $\frac{1}{2}$	"
Common'.....	" 9	" 9	92	32 to 40	Stiff	2 to 2 $\frac{1}{2}$	16 32	51	Slightly.

Two-ROWED BARLEY—Test of varieties.

Name of variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per acre.	Weight per Bushel.	Proportion Rusted.
				Inches.		Inches.	Bus. lbs.	Lbs	
Kinver Chevalier.	May 9	Aug. 18	101	26 to 30	Weak	3 to 4	36 32	49	Very slightly.
French Chevalier.....	" 9	" 23	106	33 to 36	Stiff	3½ to 4	36 32	50	"
Golden Melon	" 9	" 23	106	34 to 36	Weak ...	3½ to 3¾	34 8	49	"
New Golden Grains.....	" 9	" 13	96	26 to 30	Medium...	3½ to 4	30 20	49	"
Canadian Thorpe..	" 9	" 13	96	36 to 40	Stiff ...	2½ to 3	29 8	50½	Slightly.
Duck-bill.	" 9	" 23	106	36 to 40	"	2½ to 3	27 44	49	"
Beaver.	" 9	" 23	106	32 to 36	"	3½ to 4	27 24	50	Very slightly.
Danish Chevalier... ..	" 9	" 18	101	26 to 32	Weak	3½ to 4	26 32	51	"
Goldthorpe.. .	" 9	" 23	106	36 to 40	Stiff	2½ to 3	25 40	50	"
Prize Prolific. ...	" 9	" 18	101	30 to 32	Weak	3½ to 4	24 28	49½	"
Thanet.	" 9	" 18	101	30 to 34	"	3	20 20	48½	"
Newton ..	" 9	" 18	101	26 to 32	Stiff	2½ to 2½	20 20	49	Slightly.
Two-rowed Naked	" 9	" 9	92	24 to 30	Medium...	3 to 3½	19 28	60	Very slightly.

Nine new sorts of cross-bred barleys, Swedish (two-rowed) female with Baxter's six-rowed male were tested. These all gave good results, and some of them are very promising.

They were sown at the rate of two bushels per acre in plots of 1/80 of an acre each on clay loam, on which roots were grown in 1893.

HYBRID BARLEY—Test of varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				Inches.		Inches.	Bus. lbs.	lbs.	
Sidney	May 9	Aug. 23	106	39 to 45	Stiff	3 to 3½	40 30	51	Very slightly.
Stella	" 9	" 13	96	28 to 32	"	2 to 2½	37 24	50½	"
Bolton	" 9	" 13	96	37 to 39	"	3¼ to 4	35 20	52½	"
Nugent.....	" 9	" 15	98	33 to 35	"	2 to 2½	33 16	49½	Slightly.
Pioneer.....	" 9	" 9	92	30 to 35	Weak.....	1½ to 2½	33 16	50	"
Victor.....	" 9	" 13	96	37 to 39	Stiff.....	2½ to 3	29 8	52	Very slightly.
Vanguard.....	" 9	" 13	96	33 to 41	"	2 to 2¼	27 44	49	"
Type 10.....	" 9	" 18	101	30 to 34	"	3	20 40	48½	Slightly.
" L.....	" 9	" 13	96	28 to 32	"	2½ to 3¼	18 46	48	Very slightly.

EXPERIMENTS WITH OATS.

Fifty-one varieties of oats were sown on 10th May in plots of one-twentieth of an acre each on clayey loam, the land having been in hay the previous year, no fertilizers were used. All the varieties had remarkably stiff straw. The most noticeable variety in regard to stiffness was the "Schonen," which promises to be a very suitable variety to sow with pease.

The earlier sorts did not give as large a yield per acre as the later ones, this was probably due to the leaf rust or blight which struck the grain about the middle of July. The later varieties filled out better than the earlier sorts, but the grain was not as heavy on account of dry weather and leaf blight. The oat crop was about one-third

less than the usual average per acre, with average weight. The results of the tests are given in the following table:—

OATS—Test of varieties.

Name of varieties.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		In.		Bus. lbs.	Lbs	
Abyssinia.	May 10	Aug. 25	107	41	Stiff . . .	9	Sided.	65 30	41	Very slightly.
Oderbruch.	" 10	" 25	107	41	Medium. . .	10	"	64 24	44½	Slightly.
Rosedale.	" 10	" 18	100	43	"	9	"	64 14	40	Very slightly.
Bavarian.	" 10	" 27	109	38½	Stiff	7	Branching	58 28	41	"
Black Brie.	" 10	Sept. 5	118	36	"	9	"	57 22	37½	Slightly.
Cream Egyptian.	" 10	Aug. 22	104	44	"	9	Sided.	57 2	43	Very slightly.
Cave.	" 10	" 25	107	39	"	9	"	56 16	42	"
Joanette.	" 10	" 27	109	36	"	7	Branching	56 16	37	"
Golden Beauty.	" 10	" 27	109	38	Medium. . .	7	"	56 16	37	"
Early Blossom.	" 10	" 22	104	41	"	8	Sided.	56 16	40	"
Wallis.	" 10	" 25	107	39	Stiff	9	Branching	54 8	41	"
White Monarch.	" 10	" 30	112	39	"	7	"	54 8	42	"
Rennie's New.	" 10	" 27	109	35	"	7	"	52 32	38	"
Early Gothland.	" 10	" 25	107	37	Medium. . .	7½	Sided.	52 26	42	"
Early Etampes.	" 10	" 27	109	33	Stiff	8	Branching	52 26	37	"
White Russian.	" 10	" 24	106	38	"	7	"	52 12	41	"
Siberian.	" 10	Sept. 8	121	43	"	11	Sided.	52 12	40	"
Black Coulommiers.	" 10	" 5	118	38	"	9	"	52 6	38	"
Prolific Black California.	" 10	Aug. 28	110	39	Medium. . .	7½	"	50 00	37½	"
Prolific Black Tartarian.	" 10	" 25	107	40	"	7	"	49 14	39	"
Improved Bl'ck Tartarian	" 10	" 25	107	37	"	8	"	49 14	40	"
Giant Cluster.	" 10	" 30	112	39	Stiff	8	"	46 00	36	Slightly.
Flying Scotchman.	" 10	" 14	96	43	"	13	Branching	45 30	38	Very slightly.
Holstein Prolific.	" 10	" 18	100	40	"	8	"	45 30	38	"
American Triumph.	" 10	" 30	112	34	"	7	"	43 18	38	"
Wide-awake.	" 10	" 23	105	37	"	7	"	42 32	40	Slightly.
Golden Giant.	" 10	Sept. 2	115	37	"	8	Sided.	42 14	36	Very slightly.
Poland White.	" 10	Aug. 24	106	41	Medium. . .	8	Branching	42 12	44	Slightly.
Banner.	" 10	" 16	98	41	Stiff	9	"	42 12	39	Very slightly.
Early Archangel.	" 10	" 14	96	41	"	8	"	41 26	42	"
Columbus.	" 10	" 25	107	37	"	7	"	41 6	37	Slightly.
Lincoln.	" 10	" 24	106	36	"	7	"	40 00	40	Very slightly.
Hazlett's Seizure.	" 10	" 13	95	44	"	11	"	40 00	40	"
Scottish Chief.	" 10	" 14	96	44	"	9	"	40 00	42	"
Royal Doncaster Prize.	" 10	" 25	107	37	"	9	"	40 00	40½	"
Abundance.	" 10	" 24	106	36	"	7	"	39 14	36	Slightly.
White Bonanza.	" 10	" 22	104	38	Medium. . .	8	"	39 14	44	Very slightly.
Schonen.	" 10	" 15	97	35	Very stiff. .	7	Sided.	39 14	36½	"
Welcome.	" 10	" 14	96	42	Stiff	8	Branching	39 14	41	"
Winter Grey.	" 10	" 13	95	38	Medium. . .	8	"	38 28	41	"
Challenge.	" 10	" 14	96	45	Stiff	9	"	38 28	40	"
Early Race-Horse.	" 10	" 16	98	42	"	9	"	38 28	41	"
Early English White.	" 10	" 18	100	42	"	12	"	37 22	45	"
Improved Ligowo.	" 10	" 23	105	37	Medium. . .	7	"	35 10	40	"
Victoria Prize.	" 10	" 14	96	43	Stiff	8½	"	35 10	41	"
Imported Irish.	" 10	" 16	98	43	Medium. . .	9	"	34 24	42	"
Prize Cluster.	" 10	" 13	95	42	Stiff	8	"	34 24	41	"
Canadian Triumph.	" 10	" 17	99	44	Medium. . .	11	"	34 24	42	"
American Beauty.	" 10	" 23	105	37	Stiff	7	"	34 24	37	"
White Wonder.	" 10	" 14	96	43	"	10	"	32 32	43	"
Rennie's Prize White.	" 10	" 18	100	42	"	10	"	32 12	42	"

OATS SOWN ON DRAINED AND UNDRAINED LAND.

Eight varieties of oats were sown on drained as well as undrained upland, the soil being as nearly alike as possible. The oats were sown on the drained land 11th May, and on the undrained 17th May, the undrained land being that much later in drying. The growth of straw was much shorter on the undrained land, the drought affecting it much more.

The following table gives yield per acre and weight per bushel of each variety :—

Name of Variety.	Character of Land.	Number of days Maturing.	Yield per Acre.		Weight per Bush.
			Bus.	lbs.	
White Bonanza.....	Drained.....	104	39	14	44 lbs.
“ “.....	Undrained.....	98	24	25	42 “
Canadian Triumph.....	Drained.....	99	34	24	42 “
“ “.....	Undrained.....	95	25	17	42 “
White Wonder.....	Drained.....	96	32	32	43 “
“ “.....	Undrained.....	94	24	7	43 “
Poland White.....	Drained.....	106	42	12	44 “
“ “.....	Undrained.....	100	25	19	44 “
Imported Irish.....	Drained.....	98	34	24	42 “
“ “.....	Undrained.....	96	31	27	42½ “
Wide-awake.....	Drained.....	105	42	32	40 “
“ “.....	Undrained.....	98	33	29	38 “
Doncaster Prize.....	Drained.....	107	40	..	40½ “
“ “.....	Undrained.....	107	26	13	38 “
Improved Black Tartarian.....	Drained.....	107	49	14	40 “
“ “.....	Undrained.....	106	28	2	38 “

THICK AND THIN SOWING OF BUCKWHEAT.

In order to test the relative value of thick and thin sowing of buckwheat, one acre was sown with half a bushel of seed, one with one bushel, one with one and one-half bushels, and one with two bushels per acre. Sown on sandy loam, 29th May ; harvested on 30th August.

The grain was affected with blight, and did not fill out well. The Silver-hull was the variety used.

One acre ½ bushel seed	per acre,	matured in 92 days,	11½ bushels	51 lbs. per bushel.
do 1	do	92 do	9½ do	52 do
do 1½	do	92 do	9 do	54 do
do 2	do	92 do	8 do	51 do

Judging from the results of these experiments, it would appear that in sowing Silver-hull buckwheat, there is no advantage in using more than half a bushel of seed per acre.

EARLY MEDIUM AND LATE SOWINGS OF GRAIN.

Experiments to test the relative value of early and late sowing were again carried on this year. Such experiments will probably need to be repeated many years before reliable conclusions can be reached as to results, but we find in general that it does not pay to commence to work and seed our fields in the spring before they are dry, and observation leads me to believe that some of our farmers in the Maritime Provinces begin to work their fields before they are in a fit condition, whereas a few days more drying would ensure them a larger return. This is probably the reason why some of the first plots sown in the early and late sowing tests are not up to the average in quantity.

The first grain was sown 9th May in one-twentieth acre plots, on sandy loam, the previous crop being corn, one week intervening between each subsequent sowing. These were continued for six weeks, the same kind of grain being used in each case. There were two plots each of wheat, barley and oats in each series. The following table gives the results :—

EARLY MEDIUM AND LATE SOWN OATS $\frac{1}{20}$ ACRE PLOTS.

4¼ lbs. sown per plot equal to 2½ bush. per acre.	Sown.	Har-vested.	Number of days Maturing.	Yield per Acre.		Lbs. per bush.
				Bush. lbs.		
No. 1—						
Banner.	May 9..	Aug. 23..	106	42	12	39
Prize Cluster	“ 9..	“ 13..	96	32	12	41
No. 2—						
Banner.	“ 16..	“ 27..	103	38	8	38
Prize Cluster	“ 16..	“ 22..	98	26	24	40
No. 3—						
Banner.	“ 23..	“ 29..	98	32	12	39
Prize Cluster	“ 23..	“ 27..	96	25	10	43
No. 4—						
Banner.	“ 30..	Sept. 7..	100	31	26	37
Prize Cluster	“ 30..	“ 1..	94	32	32	41
No. 5—						
Banner	June 6..	“ 13..	99	31	6	33
Prize Cluster	“ 6..	“ 10..	96	24	24	42½
No. 6—						
Banner	“ 13..	“ 19..	98	20	..	31
Prize Cluster	“ 13..	“ 17..	96	22	32	39

EARLY MEDIUM AND LATE SOWN BARLEY $\frac{1}{20}$ ACRE PLOTS.

4 $\frac{3}{4}$ lbs. sown per plot equal to 2 bush. per acre.	Sown.		Har-vested.		Number of days Maturing.	Yield per Acre.		Lbs. per bush.
						Bush	lbs.	
No. 1—								
Baxter's Six-Rowed.....	May	9..	Aug.	13..	96	18	16	52
Duckbill.....	"	9..	"	18..	101	23	16	50
No. 2—								
Baxter's Six-Rowed.....	"	16..	"	18..	94	16	12	49 $\frac{1}{2}$
Duckbill.....	"	16..	"	22..	98	17	24	50
No. 3—								
Baxter's Six-Rowed.....	"	23..	"	23..	92	15	20	50
Duckbill.....	"	23..	"	25..	94	16	32	51
No. 4—								
Baxter's Six-Rowed.....	"	30..	"	27..	90	19	28	52
Duckbill.....	"	30..	Sept.	1..	94	19	8	46 $\frac{1}{2}$
No. 5—								
Baxter's Six-Rowed.....	June	6..	"	1..	87	14	28	43 $\frac{1}{2}$
Duckbill.....	"	6..	"	11..	97	15	20	40
No. 6—								
Baxter's Six-Rowed.....	"	13..	"	7..	86	12	44	45
Duckbill.....	"	13..	"	17..	96	10	..	30

EARLY, MEDIUM AND LATE SOWN WHEAT $\frac{1}{20}$ ACRE PLOTS.

5 $\frac{1}{4}$ lbs. sown per plot equal to 1 $\frac{3}{4}$ bush. per acre.	Sown.	Har-vested.	Number of days Maturing.	Yield per Acre.	Lbs. per bush.
				Bush. lbs.	
No. 1— Red Fife	May 9..	Sept. 1..	115	16 40	60 $\frac{1}{2}$
Stanley	" 9..	Aug. 27..	110	15 40	59
No. 2— Red Fife	" 16..	Sept. 5..	112	16 30	58 $\frac{1}{2}$
Stanley	" 16..	" 1..	108	21 20	60
No. 3— Red Fife	" 23..	" 8..	108	15 20	59 $\frac{1}{2}$
Stanley	" 23..	" 7..	107	14 40	60
No. 4— Red Fife	" 30..	" 12..	105	10 20	54
Stanley	" 30..	" 11..	104	18 40	53
No. 5— Red Fife	June 6..	" 17..	103	11 40	50
Stanley	" 6..	" 15..	101	15 20	53
No. 6— Red Fife	" 13..	Did Not ripen.	.....	.. ..	..
Stanley	" 13..	"	.....	.. ..	..

MIXED GRAIN FOR FEED.

Two plots of mixed grain were sown, cut green, and cured for feed, both of these mixtures make good feed, the stock seemed fond of it.

The following table gives yield per acre, the size of the plots was $\frac{1}{10}$ of an acre. They were sown on May 11th, and harvested August 11th :

No. 1 Plot.

Quantity sown per acre.	Green.	Dry.
	Per acre.	Per acre.
5 lbs. Prize Prolific Barley.....	4½ tons.	2¼ tons.
6 “ Golden Vine Pease.....		
3½ “ Banner Oats		
{ Equal to 1 bush. each per acre. }		

No. 2 Plot.

6 lbs. Golden Vine Pease.....	{ Equal to 1 bush. each per acre. }	5½ tons.	2¾ tons.
6 " Red Fife Wheat.....			
3½ " Banner Oats.....			

FIELD PEASE.

Ten varieties of field pease were sown 10th May on one-twentieth acre plots. The soil was a light clay loam, which was cropped with turnips in 1893. The pease all made good strong growth and gave large returns.

Although not the largest yielder, the Crown pea is probably the most suitable variety to sow with other grain for mixed feed. The vine being small and stiff does not cause the grain to lodge as badly as other sorts ; it also ripens about the same time as the early varieties of grain.

The Pride is a very early and rank-growing pea, and is very fine for table use when green.

Canadian Beauty and Black-eyed Marrowfat have given the largest yield.

PEASE—Test of varieties.

Name of variety.	Date of sowing.	Date of ripening.	Number of days maturing.	Character of growth.	Length of pod.	Size of pea.	Yield per acre.		Weight per bushel.	Remarks.
					Inches.		Bus. lbs.	Lbs		
Black-eyed Marrowfat, 10½ lbs. or 3½ bus. seed sown per acre.....	May 10	Aug. 31	113	Strong..	2½ to 3	Large ..	54	20	60	Stiff vine.
Prince Albert, 7½ lbs. or 2½ bus. per acre sown.....	" 10	" 28	110	" ..	2¼ to 2½	Small ..	46	40	61½	Stiff small vine.
Multiplier, 7½ lbs. or 2½ bus. seedwn per acre.	" 10	" 29	111	" ..	2½	" ..	43	30	60½	Medium stiff vine.
Golden Vine, 7½ lbs. or 2½ bus. seed sown per acre. .	" 10	" 31	113	" ..	2 to 2½	" ..	42	40	61½	Stiff vine.
Pride, 9 lbs. or 3 bus. seed sown per acre.	" 10	" 14	96	" ..	2 to 2¼	Medium	42	00	61	Medium stiff vine.
Canadian Beauty 10 lbs. or 3½ bus. per acre sown ...	" 10	" 30	112	" ..	2¼ to 2½	Large ..	41	00	61	Stiff vine.
Potter, 7½ lbs. or 2½ bus. seed sown per acre.	" 10	" 21	103	" ..	2 to 2¼	Small ..	36	40	59	Medium stiff vine.
Mummy, 9 lbs. or 3 bus. of seed sown per acre	" 10	" 20	102	" ..	1½ to 2	Medium	35	20	62	" "
Centennial, 9 lbs. or 3 bus. seed sown per acre .	" 10	" 18	100	" ..	2¼ to 2¾	" ..	33	10	60½	Stiff vine.
Crown, 7½ lbs. or 2½ bus. per acre sown	" 10	" 14	96	" ..	2 to 2¼	Small ..	30	00	61	Stiff quick growth.

RYE.

One and a quarter acres of fall rye was sown 11th September, 1893, on loamy soil. This made very strong and vigorous growth, and matured well, ranging at maturity from five to six feet in height, and in some places taller. It was sown at the rate of two bushels per acre, giving a yield of 28 bushels per acre, weighing 57 pounds per bushel. Harvested on 30th July.

This is well known to be a valuable crop used green as food for stock.

ROOTS.

Turnips were a light crop. The first series of turnip plots were attacked by the cut worm about the middle of June. More than one-half of the young plants were destroyed and the crop was much diminished from this cause.

The second series of plots were not affected by this pest.

The White Globe turnip although a large yielder, is soft and a very poor keeper. Steele's Purple Top Swede is in our experience a desirable sort.

Pearce's Canadian Giant and the Mammoth Long Red Mangels have given the largest yields, and the plants make very strong growth.

The short white varieties of carrots are the best for stock purposes.

Among the red varieties Short Valery and Early Gem are good market sorts.

The land used for these experiments was a clay loam. The first plots were sown on 18th and 19th May. The second series on 1st and 2nd June. The yield of all roots per acre has been calculated from the quantity obtained from three rows each, 66 feet long and 2½ feet apart.

Three varieties of Sugar Beets were also sown in plots of the same size. The second sown plots proved to be considerably the best.

TURNIP PLOTS.

Name of Variety.	Character of Growth.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Ton. lbs.		Bus. lbs.		Ton. lbs.		Bus. lbs.	
Southern White Globe...	Strong..	May 18.	June 1.	Oct. 19.	Oct. 19.	30	1600	1026	40	31	700	1045	..
Davey's Swede.....	" ..	" 18.	" 1.	" 19.	" 19.	24	400	806	40	23	1960	799	20
Purple Top Swede	" ..	" 18.	" 1.	" 19.	" 19.	23	1080	784	40	26	800	880	..
Champion Purple Top...	" ..	" 18.	" 1.	" 19.	" 19.	22	1320	722	..	23	1080	784	40
Westbury Improved.....	" ..	" 18.	" 1.	" 19.	" 19.	21	680	711	20	25	600	843	20
Giant King.....	" ..	" 18.	" 1.	" 19.	" 19.	20	920	682	..	18	80	601	20
East Lothian.	" ..	" 18.	" 1.	" 19.	" 19.	20	480	674	40	23	1080	784	40
Marquis of Lorne	" ..	" 18.	" 1.	" 19.	" 19.	19	1600	660	..	22	880	748	..
Jumbo or Monarch.....	" ..	" 18.	" 1.	" 19.	" 19.	19	720	645	20	25	1040	850	40
Rennie's Prize Purple Top	" ..	" 18.	" 1.	" 19.	" 19.	18	520	608	40	15	1680	528	..
Carter's Elephant.....	" ..	" 18.	" 1.	" 19.	" 19.	18	80	601	20	18	80	601	20
Skirving's Swede.....	" ..	" 18.	" 1.	" 19.	" 19.	14	1568	492	48	35	1720	1195	20
Bloomsdale Swede	" ..	" 18.	" 1.	" 19.	" 19.	14	1392	489	52	27	1000	916	40

The seed of Davey's Swede was grown at the Experimental Farm, Nappan. The other varieties were obtained from Canadian seedsmen.

CARROTS—Test of varieties.

Name of Variety.	Character of Growth.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Ton. lbs.	Bus. lbs.	Ton. lbs.	Bus. lbs.	Ton. lbs.	Bus. lbs.	Ton. lbs.	Bus. lbs.
Mam. White Intermediate.....	Strong..	May 19.	June 2.	Oct. 17.	Oct. 17.	23 200	770 ..	10 1120	352 ..				
Improved Short White..	" ..	" 19.	" 2.	" 17.	" 17.	20 1360	689 20	15 1680	528 ..				
Improved Half Long White.....	" ..	" 19.	" 2.	" 17.	" 17.	18 1400	656 40	18 1400	656 40				
Iverson's Champion.....	" ..	" 19.	" 2.	" 17.	" 17.	18 520	608 40	13 1720	462 ..				
Half Long White.....	" ..	" 19.	" 2.	" 17.	" 17.	17 320	572 ..	11 ..	366 40				
Guerande or Oxheart....	" ..	" 19.	" 2.	" 17.	" 17.	16 1176	552 56	6 1200	220 ..				
Carter's Orange Giant...	" ..	" 19.	" 2.	" 17.	" 17.	16 120	535 20	14 776	479 36				
Early Gem.....	" ..	" 19.	" 2.	" 17.	" 17.	14 160	469 20	5 1000	183 20				
White Vosges.....	" ..	" 19.	" 2.	" 17.	" 17.	13 1010	450 10	11 880	381 20				
White Belgian.....	" ..	" 19.	" 2.	" 17.	" 17.	13 840	447 20	12 200	433 20				
Short Valery.....	" ..	" 19.	" 2.	" 17.	" 17.	11	366 40	9 1360	322 40				
Long Scarlet Stump-rooted.....	" ..	" 19.	" 2.	" 17.	" 17.	8 720	278 40	7 520	242 ..				

MANGELS—Test of varieties.

Evans Mam. Long Red..	Strong..	May 18.	June 1.	Oct. 18.	Oct. 18.	33 880	1114 40	22	633 20		
Pearce's Canadian Giant.	" ..	" 18.	" 1.	" 18.	" 18.	28 760	946 ..	23 1960	799 20		
Gate Post	" ..	" 18.	" 1.	" 18.	" 18.	27 1880	931 20	25 1920	865 20		
Steele's Mam. Long Red.	" ..	" 18.	" 1.	" 18.	" 18.	26 800	880 ..	29 1840	997 20		
Carter's Warden Orange Globe	" ..	" 18.	" 1.	" 18.	" 18.	23 640	777 30	20 40	667 20		
Rennie's Mam. Long Red	" ..	" 18.	" 1.	" 18.	" 18.	22 400	740 40	20 1800	696 40		
Giant Yellow Intermediate.....	" ..	" 18.	" 1.	" 18.	" 18.	22	633 20	18 1840	630 40		
Prize Long Red.....	" ..	" 18.	" 1.	" 18.	" 18.	19 1160	752 40	17 320	572 ..		
Golden Tankard	" ..	" 18.	" 1.	" 18.	" 18.	19 720	612 ..	18 696	611 30		

SUGAR BEETS.—Test of varieties.

Klein Wanzleben.....	Strong..	May 19.	June 2.	Oct. 24.	Oct. 24.	11 1760	396 ..	18 80	601 20		
Vilmorin's Improved....	" ..	" 19.	" 2.	" 24.	" 24.	15 1680	528 ..	18 1840	647 20		
French Red Top.....	" ..	" 19.	" 2.	" 24.	" 24.	17 320	572 ..	16 1000	550 ..		

EXPERIMENT TO ASCERTAIN THE EFFECT OF DIFFERENT QUANTITIES OF MANURE PER ACRE ON TURNIPS.

The land selected for this experiment was sandy loam, and was apparently all in the same state of fertility ; the previous crop was buckwheat.

One acre received twenty 30-bush cart loads of well-rotted manure per acre. One, thirty 30-bush. cart loads, and one, forty 30-bush. cart loads per acre, which was spread and ploughed in. In addition two barrels of general fertilizers were used to the acre.

The results were different from what was expected, probably due to the dry summer. Further experiments will be conducted along this line another year.

First plot 20 loads per acre, yielded 578 bushels per acre.

Second plot 30 loads per acre, gave 541 bushels per acre.

Third plot 40 loads per acre, yielded 536 bushels per acre.

LARGE ROOT PLOTS.

One-half acre of Steele's Improved Short White carrots were sown on 29th May on sandy loam soil. Thirty 30-bush. cart loads of manure and two barrels of general fertilizer being used per acre. They were pulled 23rd October, yielding 660 bushels per acre.

In addition to the turnip plots already mentioned, there was one and one-half acres of these roots which gave a yield of 750 bushels.

Also one-half acre of mangels which gave at the rate of 575 bushels per acre.

EXPERIMENTS IN CUTTING POTATOES FOR SEED.

Eight different ways of cutting potatoes for seed were tried, Pearce's Extra Early being used for this purpose.

The following results were obtained :—

Name of variety.	Marketable per Acre.	Unmarket- able per Acre.	Character.
	Bushel.	Bushel.	
Whole potatoes.....	250	40	Even lot.
One eye.....	220	10	Fairly even.
Two eyes.....	220	30	Large and even.
Three eyes.....	280	20	Large medium, even.
Butt half.....	330	50	Average.
Seed half.....	200	50	Medium.
Seed end cut off.....	380	60	Average.
Cut lengthwise.....	170	50	Small.

EXPERIMENTS WITH POTATO EYES.

Five new varieties of potatoes, consisting of 100 eyes each were received from Steele, Briggs & Marcon, Toronto.

This seed was planted one foot apart, one eye to the hill. There was very little difference in the yield of each plot, although in one case only about one-quarter of the eyes grew, while in another case about four-fifths grew. These all made good strong growth. They were planted and dug with other potato plots on the same kind of soil.

POTATO EYES PLANTED—Yield per plot.

Name of variety.	Number of Eyes planted.	Number of Eyes that grew.	Marketable.	Unmarketable.	Matured.	Remarks.
			Lbs.	Lbs.		
Freeman.....	100	68	30	5	Medium late..	White, large, round.
Early Norther.....	100	39	38	3	Medium early..	Light red, very large, round.
Pride of the Table	100	62	34	2	" ..	Red, medium large, medium round.
Pride of the Market	100	84	37	2	Medium late..	White, large, long, medium flat.
Dreer's Standard.....	100	27	39	2	" ..	Large, round, smooth flat, white.

POTATOES.

Fifty-four varieties of potatoes were planted on sandy loam in rows 26 inches apart and 66 feet long. These were all planted on the 23rd May and dug on 13th of September. They all made strong growth, and no rot was detected in any of the varieties. All yields per acre have been calculated from the quantity grown in each case on two rows of 66 feet in length.

POTATOES—Test of varieties.

Name of variety.	When Matured.	Average Size.	Quality.	Yield per Acre.			Form and Colour.
				Total.	Market-able.	Unmarketable.	
				Bus. lbs.	Bus. lbs.	Bus. lbs.	
Early Sunrise	Very early	Medium	Good.	360 00	307 30	52 30	Oblong, pink.
Delaware.....	Very late.	Large ..	Fair..	352 30	317 30	35 00	Round, white.
Late Puritan.....	Late.....	Medium	Good.	340 00	310 00	30 00	Long, round, white.
Bruce's White Beauty.	Med. early	"	"	335 00	300 00	35 00	Oval, white.
Richter's Schneerose...	Late.....	Small ..	Fair..	332 30	275 00	57 30	Round, white.
State of Maine.....	"	Large ..	"	330 00	302 30	27 30	Long, round, white.
Rural Blush	Very late.	"	"	327 30	305 00	22 30	Round, red.
Holborn Abundance...	Late.....	"	Good.	325 00	292 30	32 30	Long, round, white.
Pearce's Prize Winner.	"	Medium	"	322 30	302 30	20 00	Long, round, white.
Crown Jewel.....	Med. early	"	"	317 30	282 30	35 00	Oval, pink and white.
Toronto Queen.....	Med. late.	Large ..	"	312 30	270 00	42 30	Oblong, pink and white.
Thorburn.....	"	Medium	"	310 00	260 00	50 00	Round, pink and white.
Munroe County.....	"	Large ..	"	307 30	280 00	27 30	Long, round, light red.
Clarke's No. 1.....	Med. early	"	"	305 00	282 30	22 30	Round, white and pink.
American Wonder	Late.....	"	"	295 00	280 00	15 00	Round, white.
Everett	Med. late.	Medium	"	292 30	262 30	30 00	Oval, light, pink.
Richter's Elephant....	"	"	"	290 00	250 00	40 00	Long, round, pink white.
Chicago Market.....	"	"	"	287 30	250 00	37 30	Round, oval.
Polaris.....	"	"	"	287 30	225 00	62 30	Oblong, white.
I. X. L.....	Late.....	"	"	285 00	257 30	27 30	Long, round, white pink.
Rose's New Giant.*...	Med. late.	Large ..	Fair..	282 30	257 30	25 00	Long, round, white.
Late Goodrich.....	Late.....	Medium	"	280 00	265 00	15 00	Round, white.
Muchonic.....	"	Small ..	Good.	280 00	247 30	32 30	Round, blue and white.
Early Ohio.....	Early.....	Medium	"	275 00	232 30	42 30	Oval, light pink.
New Variety No. 1....	Med. late.	Large ..	"	275 00	250 00	25 00	Round, pinkish white.
Compton's Surprise....	Late.....	Medium	Fair..	275 00	252 30	22 30	Round, white.
London.....	Med. late.	"	"	272 30	237 30	35 00	Oval, pink.
Harbinger.....	Med. early	"	Good.	270 00	232 30	37 30	Round, light pink.
Early Gem.....	Very early	Large ..	"	267 30	225 00	42 30	Oval, pink.
Pearce's Extra Early..	Early.....	Medium	"	262 30	227 30	35 00	Long, round, white pink.
Daisy	Med. early	"	"	260 00	232 30	27 30	Round, white and pink.
Empire State.....	Late.....	"	Fair..	260 00	210 00	50 00	Long, round, white.
Algoma No. 1.....	Very early	Large ..	Good.	260 00	220 00	40 00	Oblong, pink and white.
Dixon's Early.....	Med. early	"	"	260 00	212 30	47 30	Oval, pink and white.
Rosy Morn	Med. late.	Medium	Fair..	255 00	215 00	40 00	Round, dark pink.
Northern Spy.....	Late.....	"	Good.	252 30	207 30	45 00	Round, red.
Home Comfort.....	Med. late.	Large ..	"	250 00	230 00	20 00	Oblong, red.
Acadian.....	"	Medium	"	233 36	194 40	38 56	Round, blue.
Richter's Imperial....	"	"	Fair..	230 00	207 30	22 30	Round, white.
Stray Beauty.....	Med. early	"	Good.	227 30	155 00	72 30	Round, red.
Early Puritan.....	"	"	"	225 00	185 00	40 00	Round, white.
Copper.....	Late.....	"	"	223 50	175 00	48 50	Round, blue.
Beauty of Hebron.....	Med. early	"	Fair..	220 00	185 00	35 00	Oblong, white and pink.
Rural New Yorker No2	Late.....	"	Good.	219 30	197 30	20 00	Round, white.
Sharpe's Seedling....	Med. early	"	"	217 30	185 00	32 30	Round, pale pink.
Earliest of all.....	Early.....	Small ..	"	215 00	177 30	37 30	Oval, white and pink.
World's Fair.....	Med. late.	Medium	"	212 30	193 20	19 10	Round, white.
Sugar	"	Small ..	Fair..	207 30	175 00	32 30	Round, white.
Lizzie's Pride.....	"	Medium	Good.	200 00	150 00	50 00	Oval, white and pink.
Dakota Red	"	"	"	197 06	170 20	26 46	Round, red.
Early Rose.....	Early.....	Small ..	Good.	192 50	170 20	22 30	Oval, pink.
Lee's Favourite.....	"	"	"	180 00	135 00	45 00	Round, pink and white.
Burpee's Extra Early..	Very early	Medium	"	177 30	160 00	17 30	Round, pink and white.
Seedling No. 214.....	Early.....	V. small	"	175 00	122 30	52 30	Round, white.

CORN.

Nine varieties of corn were sown 23rd May in rows and in hills, two rows each, 66 feet long and 3 feet apart. The hills were also 3 feet apart each way, all on sandy loam soil.

Sowing in rows gave the largest returns per acre, and required less labour, the seed being sown in rows with the seed drill.

Pearce's Prolific and Longfellow corn proved to be the best varieties, and gave satisfactory results. The early frost of 7th September prevented the corn from properly maturing.

CORN.

Name of Variety.	Date of Sowing.	Date when cut.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
				Tons.	lbs.	Tons.	lbs.
Pearce's Prolific.....	May 23..	Sept. 15..	Glazed	14	1150	9	1250
Gold Medal Dent.....	" 23..	" 15..	Silking.....	14	600	11	1650
Longfellow.....	" 23..	" 15..	Glazed	14	600	9	1250
Mitchell's Extra Early	" 23..	" 15..	Hard glazed..	12	750	5	1550
Livingston.....	" 23..	" 15..	Silking.	11	1100	9	150
Rural Thoroughbred White Flint	" 23..	" 15..	Tasselling . .	10	1450	11	110
Angel of Midnight.....	" 23..	" 15..	Soft glazed ...	10	1450	8	500
Smut Nose.....	" 23..	" 15..	"	7	850	7	1950
Compton's Early.....	" 23..	" 15..	Glazed.....	6	100	6	1750

ROBERTSON MIXTURE.

Two acres of corn was sown on 26th May, 30 pounds of seed being sown per acre. The soil was a poor sandy loam. Forty 30-bush. cart loads of manure and one barrel of superphosphate was used per acre. The manure was ploughed in, and the fertilizer sown broadcast and harrowed in. The seed was sown with the seed drill in rows three feet apart. A heavy frost on the 7th September prevented it from properly maturing, and considerably reduced the yield per acre. It was cut on 15th September, giving a yield of 12 tons 130 pounds per acre.

One acre of English horse beans was sown on 26th May, 40 pounds of seed being used per acre, sown with the seed drill in rows 3 feet apart. The soil was similar to that of the corn field, and was prepared and fertilized in the same manner and gave a yield of 4 tons 1,485 pounds per acre.

One-half acre of sunflowers were sown 26th May, eight pounds of seed being used, giving a yield of 3,357 pounds or 3 tons 714 pounds of heads per acre. This soil received the same treatment as the corn and beans, and the seed was sown with the drill 3 feet apart in rows.

These were well mixed when put in the silo, the corn and beans were cut to about $\frac{3}{4}$ inch length, the sunflower heads were put in whole, making about 32 tons of the mixture.

BORDEAUX MIXTURE FOR THE PREVENTION OF POTATO ROT.

The Bordeaux mixture as a fungicide, as applied to potatoes for the prevention of rot, was again experimented with this year, a plot of State of Maine potatoes being used. The yield of one-half of the plot treated was about the same as the half not treated, there being no rotten ones in either case.

All plots of the different varieties of potatoes were treated with the Bordeaux mixture in combination with Paris green. There were no rotten ones in any of the plots. A sample box of Church's potato bug finish was sent for trial by their agent, this appeared to be equally as effective as the Paris green. This powder was applied when the dew was on, two applications being sufficient.

GARDEN BEANS.

Seven varieties of garden beans were sown on 26th May ; these made good growth. The Arctic, a yellow and white variety, maturing in 98 days, was not as prolific as the Early Dun Coloured which matured at the same time.

Name of Variety.	Number of days Maturing.	Remarks.
New Stringless Green Pod.....	.....	Fine for use green.
Thorburn's Early Refugee Wax.....	107	Fine variety for use green.
Emperor William.....	110	Not early enough for our season.
Arctic.....	98	Very fine early variety.
Early Dun Colour.....	98	“ “
Detroit Wax.....	103	Good early variety.
Red German Wax.....	105	“ “

PARSNIPS.

Two varieties of parsnips were sown on 12th May, the Hollow Crown and Maltese. The Maltese, with a few exceptions, failed to germinate. The Hollow Crown made good strong growth.

WATER AND MUSK MELONS.

Several varieties of melons were sown on 26th May, the varieties were Phinney's Early, Montreal market, Col. Preserving, Evans' Superb and Cossaba Large Musk. These varieties all did well until 7th September, when they were completely killed by the early frost.

CUCUMBERS.

Five varieties of cucumbers were sown on 26th May ; these were all killed with the early frost. The following is a list of the varieties in order of their earliness :—

	Character of growth.
Siberian.....	Good yield ; good for pickling.
New Giant Pera.....	Large yield.
Japanese Climbing.....	Fair yield.
Improved White Spine.....	Poor yield.
Cool and Crisp.....	Fair yield.

ONIONS.

Twelve varieties of onions were sown on 11th May. These made poor growth, and with a few exceptions did not mature. The following is a list of varieties grown :—

King of Earlies, Wethersfield W. B., Southport White Globe, Large Red Globe, Yellow Globe, Danvers, New Queen White, Small Silver Skin, Giant Prize Taker, the Oregon, Red Victoria, and Fancy Yellow Globe Danvers.

The King of Earlies matured the best, Wethersfield and Southport White Globe gave fair returns.

GARDEN PEASE.

Eight varieties of garden pease were sown on 12th May. The Sunol variety made very strong and rapid growth, but was not very prolific. Bliss's American Wonder was one of the most prolific varieties.

GARDEN PEASE.

Name of Variety.	Fit for use green.	Character.
Prince of Wales.....	July 26..	Dwarf, large long pod, very prolific.
Burpee's Profusion.....	" 26..	Large pod, dwarf, very prolific.
Juno.....	" 27..	Dwarf, very long pod, medium prolific.
Horsford's Market.....	" 20..	" short pod, but very prolific.
Bliss' American Wonder.....	" 12..	" medium long pod, very prolific.
Sunol.....	" 10..	Pole or climbing, short pod, medium prolific and very early.
American Wonder.....	" 12..	Short pod, dwarf, very prolific.
Stratagem.....	" 22..	Long pod, dwarf, very prolific.

BEETS.

Nine varieties of beets were sown on May 11th. On account of the dryness during the early part of the season some of these made poor growth ; one variety, the Columbus, did not seem to be much affected by the drought, and made very early, strong and rapid growth. This is a very promising sort for early market, being earlier than any of the others tested, later in the season it grows large and coarse, and is not as good then as other varieties for table use.

The Flat Egyptian and Black Queen are of excellent flavour and fine quality.

The following table gives the character and quality of the different varieties, as tested at different times :—

Name of Variety.	Form.	Growth.	Size.	Flavour.	Remarks.
Flat Egyptian.....	Flat turnip.....	Good.....	Medium..	No. 1.	Good market variety.
Columbus.....	M'd. flat turnip...	Very strong.	Large....	" 3.	" " "
Arlington's Favourite.....	Turnip.....	Good.....	Medium..	" 2.	Very good market variety.
The Lentz.....	Globe.....	".....	".....	" 3.	" " "
Black Queen.....	Long tapering....	Fair.....	".....	" 1.	" " "
Edmund's Blood Turnip....	Turnip.....	Good.....	Fair.....	" 2.	" " "
Rennie's Intermediate.....	Long tapering....	".....	Large....	" 3.	Fair market variety.
New Victoria.....	Tapering.....	".....	Medium..	" 3.	Good " "
Crosby's Improved Egyptian.	Turnip.....	".....	Large....	" 3.	" " "

TOMATOES.

Six varieties of tomatoes were sown in the hot-bed on April 18. Some of the plants were put in the cold-frame on May 21st, others were set out a week later in their permanent places.

The plants in the cold frame were removed to the beds without apparently damaging their roots. Yet the plants put out direct from the hot bed to the open ground made a stronger growth than those transplanted from the cold frame. The early frost killed the plants before the fruit was fully matured.

Varieties in order of their earliness :

Name of variety.	Remarks.
Early Ruby.....	Rough, round, flat, good crop, some ripe.
Atlantic Prize.....	Round, flat, good crop, some nearly ripe.
Earliest of all.	Medium, rough, round, good crop, some nearly ripe.
Everbearing.....	Egg shape, medium cropper.
Dwarf Aristocrat.....	Round, medium crop.
Dwarf Champion.....	" poor crop.

CABBAGES.

Twelve varieties of cabbage were sown in the hot bed on April 18th, and transplanted to the open ground May 26th. These all made good, strong growth until June 15th, when some of the plants began to wilt, on examination it was found that the cabbage maggot (*Anthomyia brassicæ*) was at work at the roots. Acting under directions given by the Central Experimental Farm bulletin No. 11, page 26, hellebore was used, but this did not prove effective, and many of the plants had by this time died; a solution of kerosene emulsion was then tried. This seemed to promise better results, but very few of the plants reached maturity.

On July 10th new plants were purchased from a local gardener, the Jersey Wakefield, Drumhead, Winningstadt and Early Blood Red varieties, these were planted in the same hills the others were in, but there was worked in around each hill about two shovels of marsh mud. These all lived and made strong growth.

CAULIFLOWERS.

Six varieties of cauliflower were started with the cabbages, receiving the same treatment. They likewise were destroyed by the maggot.

RADISHES.

Six varieties of radishes were sown on May 11th. These all made good, strong, healthy growth, some being fit to use on June 15th. But their roots were infested with a small maggot, which proved to be the raddish maggot (*Anthomyia radicum*) all the radishes were affected with these pests and they soon began to wilt and die preventing any test being made as to quality, although the earliness can be given as the growth was considerably advanced.

Name of variety.	Remarks.
Pearl Forcing.....	Stump-rooted, early, fit for use June 20.
Scarlet White Tipped.	Turnip-rooted, medium early, fit for use June 23.
Carter's Improved.....	Fine and large, medium late.
New Rosy Gem.....	An excellent variety, medium late.
Scarlet Olive Shaped.....	Oblong in shape, small taper, fit to use June 20.
Brightest Long Red.....	Long, very early, fit to use June 15.

PUMPKINS.

Two varieties of pumpkins were grown, Steele's Sugar, and Jumbo, or Mammoth King. The Jumbo gave the largest yield, both are fine varieties.

SQUASH.

Two varieties of squash, English Vegetable marrow and Long White Bush marrow were tried, these were both of excellent quality. Seed sown on May 26th.

GARDEN CORN.

Four varieties of early corn were grown in the garden. They were sown on May 23rd, the Extra Early Cory was the earliest variety followed by Mitchell's Extra Early, Dreer's first of all, and Early Vermont.

ASPARAGUS,

Three varieties of asparagus plants two years old, were planted on May 9th, 50 plants of Columbian Mammoth, 50 of Barr Mammoth, and 50 of Giant Early Argenteuil. These are all doing well.

HOPS.

Two varieties of hops were set out on May 7th, 100 roots of East Kent Golding were received from Agassiz, B. C., and 100 roots of California Cluster from E. Meeker, of Puyallup, Washington, U.S.

The East Kent Goldings were the largest roots and made more rapid progress. A few hops were borne on both sorts.

GENERAL STATEMENT OF CROPS.

Sixty-five acres in hay gave 144 tons, and in addition to the plots of grain for testing purposes, which yielded 301 bushels, there were five acres in oats and pease, which gave 197 bushels; three-quarter acres in pease which gave 19 bushels; eight acres of marsh in oats, which gave 194 bushels, and three acres in buckwheat, yielding 38 bushels, making in all 749 bushels of grain.

The root plots consisting in all of eight acres gave a yield of about 4,300 bushels. Three acres were sown with corn, beans and sunflowers for ensilage, which gave about 32 tons, and three acres were devoted to crops for feeding purposes during the summer months. About $4\frac{1}{2}$ acres were in small fruits, nursery, shrubbery garden, &c. The remainder of the cleared land was devoted to pasturage.

DRAINAGE.

No drainage was done on the upland, but four acres were underdrained on the marsh for the purpose of testing the practicability and economy of underdraining marsh land. So far the drains are working well, and it is hoped that this work may be continued another year, so that a sufficient area may be underdrained to thoroughly test the advantages of such drainage of marsh land, also to ascertain the cost per acre of such work.

GRASSES.

Thirty-five varieties of grasses were received from the Central Experimental Farm. These were sown in plots on 30th April. In the following list the names and growth of the different varieties are given:—

- Colorado Blue Stem, *Agropyrum glaucum*, fair growth.
- Western Rye Grass, *Agropyrum tenerum*, very strong growth.
- Meadow Fox-tail, *Alopecurus pratensis*, did not grow,
- Sweet Vernal, *Anthoxanthum odoratum*, good growth.
- Tall Oat Grass, *Avena elatior*, very strong growth.
- Slough Grass, *Beckmannia erucæformis*, did not grow.

Meadow Brome, *Bromus pratensis*, fair growth.
 Awnless Brome, *Bromus inermis*, medium growth.
 Fringed Brome, *Bromus ciliatus*, good growth.
 Wild Chess, *Bromus secalinus*, fair growth.
 Western Brome, *Bromus pumpellianus*, good growth.
 Mexican Brome, *Bromus segetum*, very strong growth.
 Crested Dog's Tail, *Cynosurus cristatus*, strong growth.
 Orchard Grass, *Dactylis glomerata*, strong growth.
 Northern Blue Joint, *Deyeuxia Langsdorffii*, did not grow.
 Canadian Lyme Grass, *Elymus Canadensis*, did not grow.
 Lyme Grass, *Elymus Virginicus*, fair growth.
 Hard Fescue, *Festuca duriuscula*, fair growth.
 Tall Fescue, *Festuca elatior*, good growth.
 Sheep's Fescue, *Festuca ovina*, did not grow.
 Holy Grass, *Hierochloa borealis*, did not grow.
 Perennial Rye Grass, *Lolium perenne*, very strong growth.
 Satin Grass, *Muhlenbergia Mexicana*, did not grow.
 Bearded Satin Grass, *Muhlenbergia sylvatica*, did not grow.
 Switch Grass, *Panicum virgatum*, good growth.
 Canadian Blue Grass, *Deyeuxia Canadensis*, did not grow.
 Wood Meadow Grass, *Poa nemoralis*, good growth.
 June Grass, *Poa pratensis*, did not grow.
 do *Poa pratensis*, white form, did not grow.
 do *Poa pratensis*, from Calgary, do
 Fetid Drop-seed grass, *Sporobolus heterolepis*, do
 Neglected Blue Joint, *Deyeuxia neglecta*, do

The varieties that have given good results in the past are : Western Rye Grass, Orchard Grass, Late or Fowl Meadow, Fringed Brome, Reed Canary, Western Brome, Tall Fescue, Meadow Fescue and Austrian Brome. The Reed Canary Grass and Western Brome are very early and rank-growing grasses, the former being 23 inches high on 1st June. The Late Meadow is a very fine late pasture grass.

CURRENTS.

Several varieties of red, white and black currants have been experimented with. In point of productiveness they rank in the following order : Red—New Red Dutch, La Conde, Knight's Early Red, La Hative and La Fertile ; White—White Transparent, White Grape and White Dutch ; Black—Lee's Prolific, Ogden's Black and Baldwin Black.

The New Red Dutch, White Transparent, and Lee's Prolific are the most promising sorts and have made the strongest growth.

RASPBERRIES.

Several varieties of raspberries have been experimented with, the Cuthbert has proved to be the best variety of red, and the Golden Queen the finest flavoured and most productive of the yellow sorts.

GOOSEBERRIES.

The English gooseberries set out in the spring of 1893, with a few exceptions, did remarkably well, and gave some fine fruit.

About the 10th of June the gooseberries were attacked by "the shot hole" fungus (*Septoria ribis*), which spread very rapidly, the bushes were sprayed on June 12th with a solution of Potassium Sulphide, 1 oz. to a bucket of water, again on the 16th with Bordeaux mixture, which was repeated on the 22nd. These applications completely checked and killed the disease. The disease seemed to yield more readily to the Bor-

deaux mixture, and I think this may be safely recommended as a reliable remedy. Mildew never made its appearance, probably on account of the early application of these fungicides.

The American varieties of gooseberries were not so susceptible to the attacks of the fungus as the English sorts, although they were not by any means free from it.

The following is a list of the gooseberries experimented with. The yield of fruit under the circumstances referred to was small :—

Whenham's Industry,	Companion,
White Champagne,	Early Sulphur,
Bobby,	Improved Early Hedgehog,
Red Champagne,	Green Overall,
Dublin,	Governess,
Queen Victoria,	Leader,
Leveller,	Whitesmith,
Crown Bob,	Lancashire Lad,
Pitmaston Green Gage,	Bonny Lass.

Whitesmith, Governess and Early Sulphur were the earliest varieties, among the later ones Whenham's Industry, Victoria, Green Overall and Leader gave the best returns.

The Downing, Smith's Improved and Houghton proved to be the most serviceable American varieties.

STRAWBERRIES.

The Bubach, Sharpless and Warfield strawberries have proved to be excellent varieties here. Some fine fruit was grown on the plants sent from the Central Experimental Farm in August, 1893, and the plots of these will be extended. The following additional sorts are also under test :—Nicanor, Crawford, Barton's, Moore's Prolific, Filora, Logan, Van Deman, Standard, West Brook, Surprise, and Boynton.

ORNAMENTAL TREES AND SHRUBS.

The following list of ornamental trees and shrubs includes such as have been planted on the farm from time to time, all of which are doing well, and have proven hardy in this climate.

- Abies balsamea*, Balsam fir.
- Acer platanoides*, Norway maple.
- “ *rubrum*, Red maple.
- “ *saccharinum*, Sugar maple.
- Alnus glutinosa*, Sticky alder.
- Ampelopsis quinquefolia*, Virginian creeper.
- Amygdalus nana*, Double flowering almond.
- Artémisia Abrotanum*, Southern wood.
- Berberis Thunbergii*, Thunberg's barberry.
- “ *vulgaris purpurea*, Purple leaved barberry.
- “ *Aquifolium*, American holly.
- Betula papyrifera*, Canoe birch.
- “ *populifolia*, American white birch.
- Caragana arborescens*, Siberian Pea-tree.
- Corylus avellana*, Filbert.
- Deutzia crenata* fl. pl., Double crenate deutzia.
- Diervilla* (*Weigelia*) *grandiflora alba*, Large flowered white weigelia.
- “ “ *grandiflora variegata*, Variegated weigelia.
- “ “ *rosea alba*, White weigelia.
- Elæagnus angustifolia*, Russian olive.

Hydrangea paniculata grandiflora, Large flowered hydrangea.
Juniperus Hibernica, Irish juniper.

“ *Virginiana*, Red cedar.

Juglans cinerea, Butternut.

Juglans nigra, Black walnut.

Larix Americana, American Larch.

Larix Europæa, European Larch.

Lonicera Tatarica, White flowered bush honeysuckle.

“ “ *Red flowered bush honeysuckle.*

Philadelphus coronarius, Mock orange or syringa.

“ *grandiflora*, Large flowered syringa.

“ *nana*, Dwarf syringa.

“ *deutziflora*, Deutzia flowered syringa.

Picea alba, white spruce.

“ *excelsa*, Norway spruce.

“ *nigra*, Black spruce.

“ *pungens*, Rocky Mountain blue spruce.

Pinus Austriaca, Austrian pine.

“ *Mughus nana*, Dwarf Mountain pine.

“ *sylvestris*, Scotch pine.

“ “ *Rigaensis*, Riga pine.

“ *Strobus*, White pine.

Pseudotsuga Douglasii, Douglas spruce.

Populus nigra pyramidalis, Lombardy poplar.

“ *alba Bolleana*, Bolle's poplar.

Pyrus Americana, American mountain ash.

“ *Aucuparia*, European mountain ash.

Quercus Robur, English oak.

Retinospora filifera, Thread-like retinospora.

“ *plumosa*, Plumose retinospora.

“ *plumosa aurea*, Golden pl. retinospora.

Ribes aureum, Yellow flowering currant.

Salisburia adiantifolia, Maiden hair tree.

Salix laurifolia, Laurel-leaved willow.

Spiræa Californica, Californian spiræa.

“ *Media rotundifolia*, Round-leaved spiræa.

“ *opulifolia aurea*, Golden-leaved spiræa.

“ *Van Houttei*, Van Houtte's spiræa.

Syringa Josikæa, Josika's lilac.

“ *vulgaris alba*, White lilac.

“ “ *purpurea*, Purple lilac.

Thuja occidentalis, Common arbor-vitæ.

“ “ *globosa*, Globose arbor-vitæ.

“ “ *pyramidalis*, Pyramidal arbor-vitæ.

“ “ *Douglas, No. 2*, Douglas' arbor-vitæ.

Tilia vulgaris, European Linden.

Tsuga Canadensis, Hemlock spruce.

Ulmus Americana, White elm.

“ *campestris*, English elm.

“ *racemosa*, Rock elm.

Viburnum Lantana, Pliant viburnum.

“ *opulus*, High bush cranberry.

Morus hybrida, Russian mulberry.

Shrubs added to the collection during the past summer, which will be reported on as to hardiness, after they have been further tested.

Rosa rubrifolia, Red-leaved rose.

Lonicera chrysantha, Bush honeysuckle.

Ligustrum Amurense, Amur privet.
Pyrus baccata cerasiformis, Cherry-leaved pyrus.
 " *sanguinea*, Red berried crab.
 " *macrocarpa*, Large fruited berried crab.
 " *genuina*, True berried crab.
 " *prunifolia*, Plum-leaved crab.
Diervilla (Weigelia) lonerii, Dark red weigelia.
 " " *candida*, White flowered weigelia.
 " " *hybrida Hendersoni*, Henderson's weigelia.
Exochorda grandiflora, Large flowered exchorda.
Cornus mas elegantissima, Elegant dog wood.

Thirty-five varieties of lilacs were also received and planted in nursery rows. It is proposed to plant these in a large clump, so that the different sorts of this desirable shrub may be more readily examined and compared. These varieties are given in the following list:—

Ambroise veschaffelt,	Souv. de la Spathe,
Flora plena,	Rubra Insignis,
Common white,	Emodi,
Dr. Lindley,	Cœrula superba,
Virginal,	Beranger,
Persian white,	Pyramidalis,
Common purple,	Villosa,
Bertha Damman,	Laciniata, Persian,
Violacea,	Prof. Stockhart,
Lavanensis,	Princess Marie,
Mathieu De Dombasle,	Nigricans,
Rouge de Marley,	Gloire de Croncels,
Japonica,	Madame Moser,
Sangeana,	Renoncule,
Languis,	Gloire de Lorraine,
President Massart,	Ville de Troyes,
Persian small flowering,	Hyacinthaflora.

ORCHARD.

The orchard which has been planted, contains now 81 varieties of apples, 8 of crab apples, 20 of pears, 29 of cherries, and 25 of plums. The soil is a clay loam, under-drained, the apple trees have been planted 36 feet apart, each way, and the pears, plums and cherry trees 18 feet apart each way. A part of the trees were set out in 1889-90, and the remainder since then.

The Yellow Transparent, Anis and Sultan are very early and fine varieties of apples ripening by the 1st of September. The White Astrachan, Red Astrachan, Tetofsky and Borovinka, next in earliness, have fruited fairly well. The Longfield and Haas were the most prolific sorts. Maidens Blush and Scotts Winter have also done well, the latter seems to be a very fine variety of winter apple, most of the other varieties planted have not yet fruited. The planting of a second apple orchard was begun in 1892, on a piece of unbroken land in the woods surrounded by a shelter belt of spruce trees. It is expected that this will be completed next year.

APPLE TREES.

Name of Variety.	Fruited.	No. of trees planted.	No. of trees alive.	Season's growth.	Name of Variety.	Fruited.	No. of trees planted.	No. of trees alive.	Season's growth.
<i>Planted in the fall of 1889.</i>		1889	1894	In.	<i>Planted in the spring of 1891.</i>		1891	1894	In.
Tetofsky.....	1894	3	1	10	Wolf River.....		2	..	..
Anisovka.....		2	1	17	Magog Red Streak.....		2	..	..
Serinkia.....		2	2	17	Longfield.....		2	..	..
Aport.....	1894	2	2	15	Bottle Greening.....		2	1	7
Ananasnoe.....		2	2	18					
Titovka.....	1894	2	2	17	<i>Planted in the spring of 1892.</i>				
Blackwood.....	1894	2	2	17	Peach.....	1894	3	3	16
Steklianka.....		2	0	..	Princess Louise.....		2	2	20
Ostrakoff.....	1893-94	2	2	11	Twenty oz Pippin.....		2	0	..
Borovinka.....	1894	2	1	11	Walbridge.....		2	2	19
Bellflower.....		3	1	13	Red Beitegheimer.....		2	1	20
Gravenstein.....		5	1	9	Northern Spy.....		2	2	20
McIntosh Red.....		1	1	7	Duchess.....		4	4	17
<i>Planted in the spring of 1890.</i>		1890	1894		Chenango Strawberry.....		2	2	18
Canada Baldwin.....	1894	3	3	20	Baldwin.....		2	0	..
Rambo.....		3	2	17	Bellflower.....		2	2	12
Canada Red.....		3	2	11	Wagener.....		1	1	10
Jonathan.....		3	3	16	Golden Russet.....		1	1	12
Benoni.....		3	2	15	Grimes' Golden.....		1	1	3
Blue Pearmain.....		1	1	9					
Keswick Codlin.....		3	3	15	<i>Planted in the spring of 1893.</i>		1893	1894	
R. I. Greening.....		3	3	6	Wellington.....		2	2	14
Fameuse Sucre.....		3	2	10	Red Beitegheimer.....		2	2	8
Longfield.....	1893-94	3	3	16	King.....		4	3	13
McIntosh Red.....		2	2	7	Milding.....		1	1	11
Duchess.....	1892-3-4	3	3	8	Peter.....		1	1	17
Mann.....		3	3	8	Ben Davis.....		2	2	15
Wagener.....	1894	3	2	10	Walbridge.....		2	2	8
Sultan.....	1894	3	3	10	Twenty oz Pippin.....		3	2	18
Ontario.....	1894	3	3	7	Roxbury Russet.....		2	2	14
Fameuse.....		3	2	7	Ribston Pippin.....		2	2	10
Anis.....	1894	2	2	9	Bottle Greening.....		1	1	7
St. Lawrence.....		3	3	11	Trenton.....		1	1	22
Winter St. Lawrence.....		3	2	9	Colvert.....		1	1	7
Nonpareil.....		3	0	..					
Pewaukee.....	1894	3	3	11	<i>Planted in the spring of 1894.</i>				
Maidens Blush.....	1892-94	3	3	11	Peach.....		1	1	11
Haas.....	1892-94	3	3	11	Stark.....		1	1	6
Red Astrachan.....	1893-94	5	5	8	Ribston Pippin.....		4	4	18
Wealthy.....	1893-94	3	3	8	Spitzenburg.....		2	2	5
Yellow Transparent.....	1892-94	5	5	9	Hibernal.....		1	1	7
Talmans Sweet.....	1894	3	3	10					
Northern Spy.....		3	3	9					
Alexander.....	1894	3	3	11					
Colvert.....		3	2	7					
Scott's Winter.....	1892-94	3	3	15					
Grimes' Golden.....	1893-94	5	4	4					
Golden Russet.....	1894	3	3	11					

APPLE TREES planted in second orchard on uncultivated land.

Name of Variety.	Fruited.	No. of trees planted.	No. of trees alive.	Character of growth.	Name of Variety.	Fruited.	No. of trees planted.	No. of trees alive.	Character of growth.
<i>Planted in 1890.</i>		1890	1894	In.	<i>Planted in the spring of 1892.</i>		1890	1894	In.
Blue Pearmain.....		2	2	10	Yellow Transparent.....		2	2	2
Derby.....		3	3	7	American Golden Russet ..		2	1	8
Winter Bough.....		3	3	11	Hastings.....		2	1	2
Bethel.....		3	2	9	Nothern Spy.....		3	3	6
<i>Planted in the spring of 1891.</i>					<i>Planted in the spring of 1893.</i>				
Pewaukee.....		2	2	2	Duchess.....		2	2	9
White Astrachan.....	1894	3	2	10	Gravenstein.....		3	3	4
Wagener.....		1	1	2	Fameuse.....		2	2	8
Grimes' Golden.....		2	1	6	Red Astrachan.....		3	3	6
					Colvert.....		1	0	0

CRAB APPLE TREES planted in the springs of 1891, 92 and 93, these have all grown well.

<i>Planted in 1891.</i>		1891	1894		<i>Planted in 1893.</i>		1891	1894	In.
Hyslop.....	1893-94	3	3	36	Gen. Grant....		2	1	13
Montreal Beauty.....	1893-94	4	4	27	Martha.....		2	2	17
Transcendent.....	1894	3	3	18	Whitney.....		2	2	21
Yellow Siberian.....	1893-94	3	3	18	Transcendent.....		2	2	18
<i>Planted in 1892.</i>					Hyslop.....		2	2	17
Gen. Grant....		2	2	20	Montreal Beauty.....		2	2	22
Gideon.....		1	0	0					

PEARS.

<i>Planted in the spring of 1892.</i>	1892	1893	In.	<i>Planted in the spring of 1893.</i>	1893	1894	In.
Tyson.....	3	3	18	Seckel.....	2	0	0
Osband's Summer.....	2	2	16	Mount Vernon.....	3	3	15
Sheldon.....	2	1	18	Dempsey.....	1	1	18
Bartlett.....	5	3	10	Frederick Clapp.....	1	1	6
Clapp's Favourite.....	4	3	8	Clapp's Favourite ..	3	2	7
Mount Vernon.....	3	0	0	Howell.....	2	2	15
Flemish Beauty.....	5	5	22	Sheldon.....	2	2	20
Beurre Superfin.....	2	2	18	Doyenne Boussock.....	2	1	7
Beurre Clairgeau.....	3	1	27	Beurre Hardy.....	2	2	12
Beurre d'Anjou.....	5	5	10	Tyson.....	2	2	13
Seckel.....	2	0	0	Goodale.....	2	1	4
Dr. Reeder.....	2	1	10				
Doyenne Boussock.....	3	0	0				
Duchess.....	2	1	19				
Lawrence.....	2	2	17				

CHERRIES.

Name of Variety.	No. of trees planted.	No. of trees alive.	Season's growth.	Name of Variety.	No. of trees planted.	No. of trees alive.	Season's growth.
<i>Planted in the spring of 1891.</i>	1891	1894	In.	<i>Planted in the spring of 1893.</i>	1893	1894	In.
Early Richmond.	6	6	18	Black Eagle.	2	1	14
<i>Planted in the spring of 1892.</i>				Lieb.	2	2	8
English Morello.	3	3	15	English Morello.	2	2	13
Dyehouse.	1	1	24	Empress Eugenie . . .	2	0	0
Wragg.	2	2	13	Downer's Late Red.	2	0	0
Ostheim.	2	2	14	Louis Phillippe.	2	2	18
Olivet.	4	3	12	Great Bigarreau.	2	0	0
Black Tartarian.	4	2	17	Lithaur.	2	0	0
Early Richmond.	4	4	18	May Duke.	5	0	0
Late Duke.	2	2	18	Napoleon.	3	2	18
Downer's Late Red.	2	0	0	Gov. Wood.	2	0	0
May Duke.	5	0	0	Orel.	1	1	18
Windsor.	3	3	11	Shadow Amarelle.	3	3	18
Coe's Transparent.	2	2	19	Gruner Glas.	3	0	0
Yellow Transparent Spanish.	2	2	14	Elton.	2	1	17
Montmorency.	2	2	15	Montmorency.	2	2	17
Napoleon.	3	1	27	Knight's Early Black.	2	2	2
Gov. Wood.	3	3	8	Windsor.	2	1	17
Black Heart.	3	2	17	Love Apple.	2	0	0

PLUM TREES.

Name of Variety.	No. of trees planted.	No. of trees alive.	Season's growth.	Name of Variety.	No. of trees planted.	No. of trees alive.	Season's growth.
<i>Planted in the spring of 1892.</i>	1892	1894	In.	<i>Planted in the spring of 1892.</i>	1892	1894	In.
Moore's Arctic.	2	2	20	Stanton.	2	2	20
Shipper's Pride.	3	3	18	Washington.	2	2	21
McLaughlin.	2	1	25	<i>Planted in the spring of 1893.</i>	1893	1894	
Niagara.	2	2	15	Geuii.	2	2	17
Pond's Seedling.	6	3	12	Lombard.	2	2	19
Duane's Purple.	2	2	18	Large Golden Prolific.	2	2	15
Geuii.	3	2	21	Washington.	2	1	27
Reine Claude.	2	2	23	Moore's Arctic.	3	3	18
Prince's Yellow Gage.	4	4	26	Reine Claude.	2	2	18
German Prune.	3	3	17	Shippers Pride.	2	2	18
Bradshaw.	3	3	20	Burbank.	1	0	0
Imperial Gage.	5	5	18	Prunus Simonii.	1	1	23
Lombard.	5	5	19	Fellenburg.	2	2	16
Fellenburg.	1	1	8	Hudson River Purple Egg.	1	1	23
Lawrence's Favourite.	1	1	17	Imperial Gage.	2	2	14
Shropshire Damson.	1	1	17	Niagara.	2	2	11
Coe's Golden Drop.	2	2	20	Saunders.	2	1	11
Yellow Gage.	2	2	24				

FLOWERS.

Being often asked for a list of the most attractive and hardiest varieties of annual and perennial flowering plants, the following list is submitted as embracing the most useful and promising varieties tested here.

The annuals that do well, sown in the open ground, those that require to be started in the hot bed and transplanted, and the perennials are arranged in separate tables. It is hoped that the information here given will enable the farmers of our rural districts to make suitable selections of these desirable flowers and induce them to pay more attention to the beautifying of their places and making their surroundings more attractive, thereby giving the young people a better chance to study the beauties of nature and at the same time foster a stronger love for their homes.

The perennials require to be mulched during winter.

ANNUAL FLOWERS—Seed sown in the open ground.

Alyssum Sweet.....	Hardy.....	Beautiful, white, fine for border.
Anagallis (less than 1 ft. high).....	".....	Fine and beautiful for border.
Asperula azurea setosa.....	".....	Dwarf, good edging flower.
Aster.....	".....	Queen of Autumn flowers.
Acroclinium (Everlasting).....	".....	18 in high, very pretty.
Brachycome (Swan River Daisy).....	".....	8 in high, pretty small flower.
Calendula (Marygold).....	".....	Fine late bloomer.
Calliopsis (Beautiful eye).....	".....	Very showy, 1 to 3 ft. high.
Candytuft (Iberis).....	".....	Fine old flower.
Centaurea Cyanus (Bachelor's Button)...	".....	One of the best flowers.
Centranthus.....	".....	Fine variety,
Chrysanthemum.....	".....	Fine late bloomer.
Clarkia.....	".....	Fine of easy culture.
Convolvulus (Minor).....	".....	Brilliant flower, trailer.
Datura Wrightii (Trumpet flower).....	Half-hardy..	Large flower, very beautiful.
Delphinium (Larkspurs).....	Hardy.....	Short bloomers, very fine.
Dahlia.....	Half-hardy..	Fine flowers, keep roots in cellar during winter.
Double Daisy (Bellis).....	Hardy.....	Does best with plenty of water and shade.
Dianthus (Japan Pink, China Pink, Imperial Pink).....	".....	Very showy.
Erysimum.....	".....	18 in high, yellow bloom.
Eschscholtzia (California Poppy).....	".....	1 ft. high, very showy and beautiful.
Gaillardia.....	".....	Constant bloomers, very fine.
Gilia.....	".....	1 ft. high, small flower.
Godetia.....	".....	Free bloomer and beautiful.
Helianthus (Sun Flower).....	".....	Large flowers.
Lavatera.....	".....	Very showy, profuse bloomer.
Gladiolus.....	Half-hardy..	Very beautiful, keep bulbs in cellar in the winter.
Linum (Flax).....	".....	1 ft. high, beautiful bloomer.
Lupinus (Lupin).....	Hardy.....	Spike flowers, fine variety of free bloomers.
Malope.....	".....	Tall, blooms profusely.
Marigold or Tagetes.....	Half-hardy..	Yellow and brown, very beautiful.
Marvel of Peru (Four-o'clock).....	".....	Beautiful foliage and flowers.
Matricaria (Feverfew).....	Hardy.....	Fine free bloomer.
Mignonette (Reseda).....	".....	Very fragrant and fine.
Nigella (Love-in-a-mist).....	".....	Showy flower.
Nasturtium (Tall and Dwarf).....	".....	Very beautiful, showy flowers.
Pansy (Viola tricolor).....	".....	Most beautiful of flowers.
Poppy (Papaver).....	".....	Beautiful large flower.
Peas, sweet.....	".....	Free flowering, most beautiful flowers.
Phlox Drummondii.....	".....	Very beautiful, easy culture.
Rhodanthe (Everlasting).....	".....	Fine, red and white.
Scabiosa (Mourning Bride).....	".....	Fine, beautiful flower.
Salpiglossis.....	Half-hardy..	"....."
Schyzanthus.....	".....	Beautiful, easy culture.
Stocks (Dwarf and Pyramidal).....	".....	Very fine, free bloomers.
Thunbergia.....	".....	Climber with very pretty flowers.
Morning Glory.....	Hardy.....	Beautiful climber.
Venus's Looking glass.....	".....	Very pretty dwarf plant.
Zinnia Elegans.....	".....	Free bloomer, very fine.

Seed sown in the hot-bed and plants transplanted to the open ground.

Antirrhinum (Snapdragon)...	Hardy.....	Will keep in cellar during winter, very fine.
Balsam.....	Half-hardy..	Very beautiful.
Browallia.....	“ ..	Beautiful and delicate flower.
Calandrinia.....	Hardy.....	Requires sunny and dry situation, very fine.
Petunia	Half-hardy..	Profuse-flowering, easy cultivated.
Portulacca	“ ..	Brilliant, grow in sandy soil.

PERENNIALS.

Aquilegia (Columbine).	Gentiana excisa.
Anemone sylvestris.	Gaillardia aristata.
“ narcissiflora.	Galega orientalis.
Aconitum napellus, Monkshood.	Hypericum pyramidatum, St. Johnswort.
“ lycotonum squarrosa, Monkshood.	Helianthus giganteus, Sunflower.
“ cernuum “	Myosotis alpestris, Forget-me-not.
“ kusmalowi “	Potentilla fruticosa.
Allium stellarianum, Wild onion.	Papaver orientalis, Oriental poppy.
Asclepius tuberosa, Milkweed.	Salvia lavandulifolia.
Delphinium cashmerianum, Larkspur.	Solidago rigida, Golden rod.
“ graniflorum “	Sedum medinezii, Stone crop.
“ laxiflorum “	Thalictrum aquilegifolium.
“ dasyanthus “	Veronica saxatilis, Speedwell.
Dictamnus fraxinella, Gas plant.	“ fruticulosa “
Eremurus altaicus.	“ salurgoides “
Gentiana burseri.	

BULBS PERENNIAL.

Iris or flowering flag.	Tulips, parrot.
“ English.	Jonquils, single.
“ Spanish.	Narcissus.
Lilium candidum.	“ poeticus.
“ auratum.	“ tazetti.
“ speciosum.	“ pseudo scoticus.
Hyacinths, single red.	“ incomparabilis.
“ “ white.	Scilla bifolia.
“ “ blue.	“ sibirica.
Tulips single.	

DISTRIBUTION OF SEED GRAIN AND POTATOES.

In all 338 applicants have been supplied this year with wheat, barley, pease, oats or potatoes. The quantity distributed has been 3 lbs. in each package, and not more than two packages have been sent to any one applicant. No seeds of field roots, garden vegetables or flowers have been available for distribution.

Total number of varieties sent out :—

	Packages.
Potatoes.....	203
Wheat.....	138
Oats.....	290
Barley	118
Pease.....	31
Total	780

Reports have been received of 104 packages of the 780 distributed.

The Delaware potato seems to give general satisfaction, yielding in some localities as high as 85 pounds from 3 lbs. sown, and of good quality.

The Polaris has also given good results, yielding as high as 69 lbs. from 3 lbs. sown. This potato is of excellent quality and a good keeper.

The reports as to the yield of the Early Sunrise prove it to be a fine extra early variety, yielding in some cases as much as 70 lbs. from 3 lbs. sown.

The reports received on barley were few. The Golden Melon in one instance gave a yield of 78 lbs. from 3 lbs. sown. The Duckbill one of the best two-rowed sorts of barley with us has been reported by some as giving a poor yield of inferior grain. This is probably owing to the unusual drought which prevailed during the summer.

The Banner oat has given good yield in most cases. The Scottish Chief, Early Racehorse, Cream Egyptian, Early Archangel, Prize Cluster and Rosedale are all well spoken of and have given from 40 lbs. to 60 lbs. from 3 lbs. of seed sown.

The wheat generally has not given more than 30 lbs. from 3 lbs. sown. Campbell's White Chaff is a variety which appears to give general satisfaction.

MEETINGS ATTENDED.

Meetings of farmers for the discussion of agricultural subjects were attended in different parts of the Maritime Provinces :

Victoria, Cumberland Co., N. S., 25th January.
 Wolfville, King's Co., N. S., 17th and 18th January.
 Kentville, King's Co., N. S., 22nd and 23rd January.
 Yarmouth, Yarmouth Co., N. S., 28th February.
 Aylsford's, King's Co., N. S., 29th February.
 Horton Landing, King's Co., N. S., 30th February.
 Moncton, West. Co., N. B., 13th March.
 Memramcook, West. Co., N. B., 14th March.
 River John, Pictou Co., N. S., 26th June.
 Pugwash, Cumberland Co., N. S., 9th July.
 Fredericton, N. B., 16th August.
 Truro, N.S., 21st August.
 Yarmouth, N.S., 28th August.
 Southampton, N.S., 12th October.
 Amherst, N.S., 8th November.
 Centreville, Carleton Co., N.B., 24th November.

EXHIBITIONS.

Two exhibitions were attended. The Nova Scotia Provincial Exhibition held at Halifax on September 26th, 27th, and 28th, and a county fair at Sackville, N.B., on October 9th.

The farm exhibit consisted of grain threshed and in straw, roots, fruits and grasses, all grown on the farm in 1894, occupying a space of 10 by 15 feet square.

The exhibit shown this year has been placed in the Assembly Hall of the Amherst Academy, where it is hoped it will be of permanent value.

I have the honour to be, sir,

Your obedient servant,

W. M. BLAIR,
Superintendent.

EXPERIMENTAL FARM FOR MANITOBA.

BRANDON, MAN., 31st October, 1894.

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my seventh annual report of the experiments undertaken and work accomplished on the Brandon Experimental Farm during the past eleven months.

Last spring opened quite late and the April rainfall was heavier than usual, greatly delaying seeding; the first grain was sown on the Experimental Farm on the 20th April, ten days later than the average date, and the first experimental plots were not sown until 30th April, and even then many low spots in the fields were miry and germination of grain in them was delayed, allowing the weeds in these spots to get a good start which they kept throughout the season.

After the middle of May the weather remained unusually dry and the rainfall was only 5.1 inches from 1st April to 30th September, or 1.8 inches less than during the same months last year.

Some of the favourable features in the past season was the almost total absence of severe wind storms and the long open fall, the first injury from frost occurring on the 17th September, by which time all grain was either threshed or stacked.

Owing to the light rainfall the yield of all farm produce in the western and south western parts of the province was below the average of other years, but owing to the excellent harvest weather and open fall the sample of grain of all kinds was much better than usual and the only losses sustained have been through injury by smut, for in the face of the very conclusive results obtained from the use of bluestone as a smut preventive it is to be regretted that a number of farmers still either refuse to treat their seed wheat or do it so carelessly, that considerable loss has again resulted from this cause. Parties who had escaped for a number of years were heavy sufferers this year and owing to the abundant supply of good wheat, there was very little demand for smutty grain and it had to be sold at a sacrifice.

A noticeable feature of the past summer is the large exports of beef cattle from the province; it is to be regretted, however, that many of them were only thin stockers sold at a sacrifice and which should have been fed over winter and sold in spring as fat cattle at good prices.

The returns from all fodder plants have been less than usual, but farmers are everywhere learning to utilize the straw, chaff and other by-products instead of burning them as in former years and no scarcity of winter feed is anticipated.

Owing to the prevailing low price of wheat, experimental tests have been made this year with special crops, among them flax, millet seed, and pease for the purpose of comparison the money value per acre of each crop is stated; the values given are based on the wholesale prices prevailing at the farmers' market, Brandon.

VARIETY TEST OF WHEAT.

Rio Grande, the most productive variety in this year's test, has also made one of the highest average yields for the past four seasons, although a fairly good wheat, it is not considered equal to the Red Fife for milling purposes.

Dion's is a newly introduced wheat, of uncertain origin, has this year equalled the Red Fife in productiveness and matured four days in advance of that variety. Dion's

is a heavy bearded wheat, which is considered a serious objection by many farmers here. This variety will have to be tested for a number of years before reliable conclusions can be reached regarding it.

Monarch and Wright's Favourite were sent here by farmers for a comparative test, both are bald varieties, and this year rate low in productiveness.

The old favourites—Red and White Fife—are again nearly at the top of the list, and the difference between them in yield is only one bushel per acre, farmers living in districts where these varieties ripen in time to escape fall frosts in an average year will do well to hesitate before abandoning them for varieties of uncertain value. Much injury is sustained by farmers mixing these inferior varieties with their best grain, and by this means permanently injuring the quality of the grain exported from the province, for that reason farmers should use for feed any variety found inferior in quality and not mix it with their grain offered for sale as is often done.

WHEAT—Test of varieties, sown in plots of $\frac{1}{10}$ acre in sandy loam.

Name of variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		In.		Bus. lbs.	Lbs	
Rio Grande.....	April 30	Aug. 14	106	36	Stiff....	3	Bearded..	31 20	62 $\frac{1}{2}$	None.
White Fife.....	" 30	" 15	107	34	"	3 $\frac{1}{4}$	Beardless..	31 00	62	"
Dion's.....	" 30	" 11	103	33	"	3 $\frac{1}{2}$	Bearded..	30 30	63	"
Red Fife.....	" 30	" 15	107	33	"	3	Beardless..	30 00	61	"
Preston.....	" 30	" 11	103	34	"	3	Bearded..	29 40	62	"
Red Fern.....	" 30	" 13	105	35	"	3	"	29 40	63	"
Percy.....	" 30	" 13	105	35	"	3	Beardless..	29 30	61	"
Herisson Bearded.....	" 30	" 13	105	31	"	1 $\frac{1}{2}$	Bearded..	29 10	65	"
Wellman's Fife.....	" 30	" 13	105	33	"	4	Beardless..	29 10	61	"
Major C. No. 2 sport.....	" 30	" 11	103	35	"	3	"	28 40	61	"
Campbell's white Chaff.....	" 30	" 13	105	33	"	2 $\frac{1}{2}$	"	28 20	61	"
Stanley.....	" 30	" 11	103	33	"	3 $\frac{1}{2}$	"	27 30	61	"
Yeoman's Defiance.....	" 30	" 15	107	36	"	3	"	26 40	61	"
Pringle's Champlain.....	" 30	" 14	106	32	"	2 $\frac{1}{2}$	Bearded..	26 20	63	"
White Russian.....	" 30	" 15	107	33	"	3	Beardless..	26 10	62	"
Captor C. 1888.....	" 30	" 11	103	33	"	3	"	26 10	61	"
Advance.....	" 30	" 11	103	30	"	3	Bearded..	25 20	61 $\frac{1}{2}$	"
White Connell.....	" 30	" 13	105	38	"	3	Beardless..	25 00	63	"
Blenheim.....	" 30	" 11	103	33	"	3	Bearded..	24 50	60	"
Crown.....	" 30	" 12	104	35	"	3	"	24 40	60	"
Colorado.....	" 30	" 6	98	33	"	3	"	22 40	62	"
Ladoga.....	" 30	" 8	100	30	"	3	"	22 30	60	"
Ottawa.....	" 30	" 8	100	30	"	3	"	22 10	60	"
Monarch.....	" 30	" 13	105	36	"	4	Beardless..	21 50	61	"
Emporium.....	" 30	" 13	105	36	"	3 $\frac{1}{2}$	Bearded..	21 50	61	"
Black Sea.....	" 30	" 6	98	33	"	2 $\frac{1}{2}$	"	21 40	60	"
Hungarian Mountain.....	" 30	" 13	105	34	"	3 $\frac{1}{2}$	Beardless..	21 30	60	"
Old Red River.....	" 30	" 14	106	35	"	3	"	20 40	61	"
Huron.....	" 30	" 11	103	32	"	2 $\frac{1}{2}$	Bearded..	20 00	61	"
Wrights Favorite	" 30	" 13	105	35	"	3	Beardless..	17 30	60	"
Gehun.....	" 30	" 13	105	22	Fair....	2	"	12 30	62 $\frac{1}{2}$	Little.

CROSS BRED WHEATS.

A noticeable feature of this year's tests is the high standard of productiveness shown by the cross-bred wheats—Preston and Percy—these varieties ranking fifth and seventh respectively on the list, they weigh from one to two pounds above the standard, and are from two to four days earlier in maturing than the Red Fife; and yield about the same as that variety.

Percy is beardless, which will make it all the more acceptable on that account.

The parentage of the cross-bred varieties referred to in the table is as follows :—

- (Bearded) Preston—Ladoga female and Red Fife male.
- (Beardless) Percy—Ladoga female and White Fife male.
- (Beardless) Stanley—Ladoga female and Red Fife male.
- (Bearded) Advance—Ladoga female and White Fife male.
- (Bearded) Crown—Ladoga female and White Fife male.
- (Bearded) Ottawa—Ladoga female and Red Fife male.
- (Beardless) Major C No. 2 sport—Ladoga female and White Fife male.
- (Beardless) Captor C 1888—Ladoga female and White Fife male.
- (Bearded) Blenheim—Ladoga female and White Fife male.
- (Bearded) Huron—Ladoga female and White Fife male.

Thirty grains of each of the following cross-bred varieties recently originated at the Central Farm at Ottawa were sown in drills—the No. 1 variety was the most promising, having well filled heads.

All the grain was bright and hard, the quantity sown was not large enough to permit of the yield per acre being given.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Proportion Rusted.
						In.		In.		
Red Fife, female, Abundance, male	Sandy loam.	30 grains	May 16	Aug. 9	85	35	Stiff..	4½	Bearded	None.
Red Fife, female, Gehun, male	" ..	" ..	" 16	" 12	88	38	" ..	4	Beardless.	"
Hard Red Calcutta, female, Red Fife, male.....	" ..	" ..	" 16	" 13	89	44	" ..	4	Mixed..	"
Red Fife, female, Campbell's W. Chaff, male.....	" ..	" ..	" 16	" 12	88	36	" ..	3½	Beardless.	"

A TEST OF ROLLING WHEAT.

The use of land rollers after the grain is sown, was almost abandoned a few years ago ; latterly a number of farmers are reviving their use and with apparent good results.

The chief objection to the use of rollers on light land is the tendency to injury from wind storms exposing the seed ; by rolling before the grain is drilled in this difficulty is largely overcome, owing to an absence of severe wind storms the advantage of this plan was not fully tested this year. This year there has been a slight apparent gain from rolling which is sufficient to more than pay for the work. The tests were made on plots of 1/10 acre, soil gravelly loam.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Value of Grain per Acre.
RED FIFE.				In.		In.		Bus. lbs.	lbs.	
Harrowed and rolled..	May 3	Aug. 9	98	29	Stiff.	2¼	Beardless	17 10	61	\$6.86 @ 40c. per bushel.
Rolled after drilled...	" 3	" 9	98	26	"	2	"	17 00	61	\$6.80 " "
Not rolled.....	" 3	" 9	98	31	"	2¾	"	15 30	60	\$6.20 " "

WHEAT CUT AT DIFFERENT STAGES OF RIPENESS.

The result of this year's test varies very little from that of last year, the yields and weight with one exception increasing until the grain was ripe ; it is evident, however, that should danger from early frost threaten, wheat of both red and white varieties can be cut in the dough stage without a very large shrinkage either in weight or yield, and a week's time is often sufficient to save the crop from injury by frost.

Seven pecks seed per acre. Sown with common hoe drill on summer fallow.

Name of Variety.	Stage when cut.	No. days from sowing.	Date of cutting.	Yield per acre.	Weight per bushel.
				Bus. lbs.	Lbs.
Red Fife, 1st cut.	Early milk stage....	88	July 30..	18 20	55
“ 2nd “	Late “	91	Aug. 2..	22 10	58
“ 3rd “	Dough stage	95	“ 6..	28 00	61
“ 4th “	Ripe yellow.	102	“ 13..	29 20	62
White Connell, 1st cut.	Early milk stage....	88	July 30..	16 40	53
“ 2nd “	Late “	91	Aug. 2..	19 00	58
“ 3rd “	Dough stage	95	“ 6..	28 00	61
“ 4th “	Ripe yellow.....	102	“ 13..	27 20	63

SUMMARY.

- 1. Wheat cut before reaching the dough stage loses heavily both in yield and weight per bushel.
- 2. Although it is preferable to allow the grain to harden before cutting still there is very little shrinkage after the dough stage is reached or within say a week of ripening.

COST OF GROWING WHEAT PER ACRE ON SUMMER-FALLOW.

In accordance with your instruction, an endeavour has been made during the past season to determine the cost of growing an acre of wheat in this country. A careful record of the work done on a field on this farm has been kept which forms the basis of this calculation. The conditions however surrounding the various farms of this province are so different, that the cost of growing an acre of wheat to the average farmer, must vary with the circumstances in which he is placed.

Some of these conditions are the size of fields, amount of stone or scrub on the land, quality of the land; favourableness of the season, fall frosts, good or bad harvest weather, distance from market, value of land, whether wheat growing is used to supplement other agricultural products or whether teams and men have to be kept especially for this work, and last but not least the ability of the farmer himself.

The field selected for this purpose was a long field containing fourteen acres, it produced 29½ bushels per acre of No. 1 hard wheat, weighing 62 lbs. per bushel, and worth 42 cts. per bushel in Brandon at this date (31st October).

It will be seen from the following particulars that it cost \$7.88 per acre or within a fraction of 27 cts. per bushel at 29½ bushels per acre.

Cost of growing Wheat per acre on Summer-fallow.

	Per Acre.
	\$ cts.
Ploughing once.....	1 25
Harrowing twice @ 10 cts.....	0 20
Cultivating twice @ 20 cts.....	0 40
Seed, 1½ bushels per acre @ 50 cts.....	0 75
Drilling.....	0 22
Binding.....	0 33
Cord.....	0 20
Stooking.....	0 18
Stacking.....	0 60
Threshing, including meals for men, 5 cts. per bushel.....	1 46
Teaming to market 4 miles @ 1c. per bushel.....	0 29
Two years rent or interest on land valued at \$15 per acre @ 6 per cent.....	1 80
Wear and tear of implements per acre.....	0 20
Total cost per acre.....	7 88

WHEAT, RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These tests were made on $\frac{1}{10}$ acre plots, soil clay loam. As usual the earliest sown wheat and oats ripened first but is not the largest crop, this also agrees with former years. It appears that the tramping of the earliest sown plot before the land is thoroughly dry, compacts the soil and forms a crust to the permanent injury of the crop.

The wheat was sown, with a common hoe drill, 6 pecks of bluestoned seed per acre, no smut or rust.

Name of Variety.	When sown.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		In.		Bus. lbs.	lbs.	
Red Fife.....	May 1..	Aug. 13..	104	31	Stiff...	3	Beardless.	33 40	63	None.
".....	" 8..	" 15..	99	30	".....	2½	"	31 10	62½	"
".....	" 15..	" 22..	99	33	".....	3	"	33 00	63	"
".....	" 22..	" 24..	94	31	".....	3	"	32 10	63	"
".....	" 29..	" 26..	89	35	".....	3	"	29 20	62	"
".....	June 5..	Sept. 9..	96	34	".....	2½	"	22 40	61	"
Stanley.....	May 1..	Aug. 10..	101	30	".....	2	"	27 50	61	"
".....	" 8..	" 13..	97	33	".....	3¼	"	28 40	60	"
".....	" 15..	" 18..	95	30	".....	2½	"	31 10	62	"
".....	" 22..	" 22..	92	32	".....	3	"	32 50	61	"
".....	" 29..	" 24..	87	31	".....	2½	"	26 40	61	"
".....	June 5..	Sept. 4..	91	30	".....	2½	"	25 30	59½	"

SUMMARY of Wheat plots sown at different dates, spring 1894.

	Per Acre.
	Bush. lbs.
Average yield of six plots of Red Fife Wheat.....	30 20
“ “ Stanley “	28 46
“ of the two plots sown May 1.....	30 45
“ “ “ “ 8	29 55
“ “ “ “ 15	32 5
“ “ “ “ 22	32 30
“ “ “ “ 29	28 00
“ “ “ June 5	24 5

Three years' average of Red Fife Wheat sown at different dates.

Name of Variety.	—	Average yield per Acre.	Average days Maturing.	Average weight per bush.	Number of plots Rusted.
		Bush. lbs.			
Red Fife Wheat	1st plot sown ..	31 43	112	60½ lbs..	None.
“ “	2nd “ “ ..	33 46	105	60½ “ ..	“
“ “	3rd “ “ ..	33 00	102	60½ “ ..	“
“ “	4th “ “ ..	30 46	101	59 “ ..	“
“ “	5th “ “ ..	27 3	97	60½ “ ..	1
“ “	6th “ “ ..	23 10	99	59 “ ..	2

OATS—RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These tests were conducted on plots of $\frac{1}{10}$ acre each on clay loam. The effect of sowing grain before the land is in a fit condition to receive the seed is apparent with the oats as well as wheat, the first plots in each case yielding less than the second ones.

The injurious effects of alkali even in small quantities is plainly shown in the reduced yield of the two plots of oats sown on 29th May ; there was no evidence of the alkali until the grain was up when the salts showed slightly on the ground, and the few plants growing on these spots were backward and unhealthy looking.

Oats were sown with a hoe drill, eight pecks of seed per acre, not bluestoned, with the following results :—

Name of Variety.	When Sown.	Date of Ripen- ing.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		In.		Bus. lbs.	Lbs	
Banner.....	May	1 Aug.	6 97	32	Stiff....	6	Branching	66 6	39	None.
"	"	8 " "	10 94	30	"	6	"	74 24	38	"
"	"	15 " "	16 93	35	"	7	"	79 24	39	"
"	"	22 " "	22 92	39	"	8	"	66 26	40	Considerably.
"	"	29 Sept.	2 96	28	"	8	"	49 14	38	Badly. *
"	June	5 " "	5 92	37	"	8	"	50 10	35	"
Abundance	May	1 Aug.	5 96	30	"	7	"	69 14	40	None.
"	"	8 " "	10 94	34	"	7	"	75 30	41	"
"	"	15 " "	18 95	34	"	6	"	71 6	40	Slightly.
"	"	22 " "	22 92	42	"	7	"	61 16	41	Badly.
"	"	29 " "	26 88	35	"	8	"	34 24	40	" *
"	June	5 Sept.	3 90	35	"	10	"	50 30	38	"

* A small streak of alkali 3 feet wide running across these plots.

SUMMARY of Oat plots, sown at different dates, spring 1894.

	Per Acre.
	Bus. lbs.
Average yield of six plots of Banner Oats.	64 17
" " Abundance Oats.....	60 20
" of two plots sown May 1.....	67 27
" " " 8	75 10
" " " 15.....	75 15
" " " 22.....	64 4
" " " 29.....	42 2
" " June 5.....	50 20

Three years' average of Banner Oats, sown at different dates.

Variety.		Average Yield per Acre.	Average days Maturing.	Average weight per bushel.	No. plots rusted.
		Bus. lbs.		Lbs.	
Banner Oats.....	1st plot sown.....	70 26	106	35	1
"	2nd "	73 14	101	34	2
"	3rd "	72 22	97	35	2
"	4th "	62 32	94	35	3
"	5th "	56 16	94	34½	3
"	6th "	54 14	91	33½	3

SUMMARY.

1. Three years' experience would appear to indicate that the earliest sown plots of grain almost invariably ripen first.
2. That sowing grain before the land is in a fit condition for the seed results in a reduced yield.
3. Late sowing of both wheat and oats encourages rust, and lessens the yield.
4. Early sown oats always weigh the most.

THE USE OF BLUESTONE AS A SMUT PREVENTIVE.

Although trials of bluestone as a smut preventive have been carried on here for a number of years, and always with the same result, the interests at stake are so large that the test was again repeated this year, with even more than usual success, and we do not understand why some farmers fail in destroying smut by this means.

The mode of application adopted here for wheat only slightly smutty is to dissolve one pound of bluestone in 1½ pails of water ; this is sprinkled over ten bushels of grain with an old broom, keeping the wheat well stirred during the operation ; as bluestone dissolves slowly in cold water, it is recommended to use a quart or two of boiling water at first, and after the bluestone is dissolved, cold water can then be added to make up the required quantity.

The reported failures in the use of bluestone are probably due either to carelessness in stirring the wheat, so that the grains are not all wet with the solution, or from imperfectly dissolved bluestone. If the directions given are carefully followed, smut will certainly be almost wholly prevented.

Land summer-fallowed, size of plots 1/10 of an acre, six pecks per acre, bluestone liquid sprinkled on the seed, results obtained by counting the wheat heads on 3 feet square. Common drill used, soil clay loam, sown 3rd May, cut 13th August.

Variety.	How treated.	Yield per Acre.		Weight per Bush.	Smutty Heads.	Heads with no smut.	Total number heads.
		Bush.	lbs.				
Very smutty Red Fife.....	1 lb. Bluestone to 10 bushels....	23	30	61	24	449	473
“ “	1 “ “ to 5 “	22	50	61	None.	360	360
“ “	No Bluestone.....	22	30	58	112	361	473

LOOSE SMUT IN BARLEY AND OATS.

This fall many farmers report heavy losses from loose smut in coarse grains. Until the past season, the losses from this kind of smut have been small in this province, but on this farm it has been found very prevalent when infected seed is sown, and in future we may expect it to be more general unless effective steps are taken to check it.

During the past season some tests have been made on this farm with badly smutted Baxter's barley, both soaked and sprinkled with bluestone liquid, the following tables give the result of this experiment, with liquid composed of one pound of bluestone to twelve quarts of water :

How treated.	No. of smutty heads.	No. of sound heads.	Yield per acre.		Weight per bushel.	Remarks.
			Bush.	lbs.		
Soaked in bluestone liquid 5 hours	3	163	20	40	48	Germinated slowly and only 75 % Germination not injured.
Sprinkled with bluestone 1 lb. to 10 bush....	35	213	29	08	45	
No bluestone treatment.....	83	225	24	28	44	

From the above it will be seen that soaking in bluestone solution severely injures the germination of the seed, and that sprinkling only destroys about one-half of the smut, therefore neither of these plans are entirely satisfactory.

Mr. James Elder, of Virden, has tried the following plan with decided success and without injuring the germination of the seed.

A quantity of liquid is prepared, composed of one pound of bluestone dissolved in two pails of water, a coal oil barrel is then three parts filled with the grain and sufficient of the liquid is poured on to just cover the grain, this is allowed to remain for a few minutes only, when the liquid is drawn off through a $\frac{3}{4}$ -inch hole at the bottom of the barrel, and the grain emptied out, by adding about three-quarters of a pail each time the same liquid can be used a number of times.

RED FIFE ON LAND PREPARED IN DIFFERENT WAYS.

In this test the potato ground was ploughed in the spring, 1894. The summer-fallowed land was ploughed in June, 1893, and cultivated on the surface during the summer of that year, and sown without harrowing the following spring.

The third plot was sown on land summer-fallowed in 1892, sown to wheat in 1893, and simply drilled in on the stubble last spring. The soil was clay loam, and the plots one-tenth of an acre each.

The exactness of this test as a comparison between fall-ploughing and the other modes of preparation was interfered with by the fall-ploughed plot being injured by wind.

RED FIFE WHEAT.

How treated.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rust.
				In.		In.		Bus. lbs.	Lbs	
Sown on potato ground.....	May 8.	Aug. 15.	99	32	Stiff..	3	Beardless.	44 10	63	None.
“ summer-fallow	“ 1.	“ 13.	104	31	“ ..	3	“ ..	33 40	63	“
“ stubble without ploughing	“ 1.	“ 13.	104	35	“ ..	3	“ ..	26 20	62	“
“ spring-ploughed stubble..	“ 1.	“ 11.	102	30	“ ..	3	“ ..	23 00	62	“
“ fall “	“ 1.	“ 11.	102	30	“ ..	2 $\frac{1}{2}$	“ ..	17 10	62	* “

* Slightly injured by wind.

SUMMARY.

- 1. All kinds of grain crops sown after potatoes generally yield well, if the straw is only stiff enough to stand the luxuriant growth.
- 2. Summer-fallow prepared by ploughing in June and the surface cultivated during the summer always ensures a good crop on this farm.
- 3. For a second crop after a clean summer-fallow, on land free of perennial weeds, and in a dry year; simply drilling in wheat on the stubble will often give a good return, but if attempted under any other conditions it is likely to bring a failure, and in any case it cannot be called good practice.

EXPERIMENTS WITH OATS.

Many farmers throughout the province erroneously attribute the lessened yield of oats for the past three years to the more general use of the white varieties so valuable for milling purposes, and many inquiries for black varieties are being made for next year's sowing. From tables published in last year's annual report from this farm it

will be seen that the average yield for four years of Banner a good milling white oat was nearly 12 bushels per acre above the yield of Black Tartarian for the same period, and this year the difference is even greater, showing clearly that the lessened yield cannot be charged to the use of a good white oat.

From the accompanying table with its varying yields it is evident that only prolific varieties true to name should be sown. The tests referred to have been conducted on plots of $\frac{1}{10}$ acre each, soil sandy loam.

OATS—Test of varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		In.		Bus. lbs.	lbs.	
Abundance.....	May 12.	Aug. 15.	95	35	Stiff..	7	Branching.	75 10	37	None.
Banner.....	" 12.	" 13.	93	37	" ..	6	" ..	68 8	37	"
Golden Side	" 12.	" 18.	98	37	" ..	6	" ..	65 20	37	"
White Schonen	" 12.	" 20.	100	40	" ..	8	" ..	65 00	39	"
Rosedale.....	" 12.	" 13.	93	39	" ..	7	Half sided.	65 00	40	"
Holstein Prolific	" 12.	" 14.	94	35	" ..	8	Branching.	62 32	36	Little.
White Russian.....	" 12.	" 13.	93	32	" ..	7	Half sided.	57 12	38	None.
Giant Cluster.....	" 12.	" 20.	100	38	" ..	9	Sided.....	57 12	34	Little.
Golden Beauty.....	" 12.	" 18.	98	34	" ..	7	Branching.	56 26	38	None.
Abyssinia.....	" 12.	" 15.	95	36	" ..	7	Sided.....	56 6	39	"
Wallis.....	" 12.	" 11.	91	36	" ..	7	Branching.	55 30	37	"
Early Gothland.....	" 12.	" 10.	90	34	" ..	6	Sided.....	55 10	37	"
White Monarch.....	" 12.	" 13.	93	37	" ..	8	" ..	54 14	40	"
Black Tartarian Prolific.....	" 12.	" 18.	98	33	Fair..	7	" ..	54 14	33	"
Rennie's Prize White.....	" 12.	" 3.	83	33	" ..	7	Branching.	54 14	39	"
Columbus.....	" 12.	" 11.	91	30	Stiff..	5 $\frac{1}{2}$	" ..	54 14	37	"
Lincoln.....	" 12.	" 10.	90	38	" ..	6	" ..	54 4	38 $\frac{1}{2}$	"
Bonanza.....	" 12.	" 1.	81	36	" ..	8	" ..	53 18	37	"
California Prolific.....	" 12.	" 18.	98	37	" ..	8	Sided.....	52 22	33	"
Archangel.....	" 12.	" 11.	91	33	Weak	7 $\frac{1}{2}$	Branching.	52 22	39	"
Improved Black Tartarian.....	" 12.	" 18.	98	35	Stiff..	8	Sided.....	52 12	34	"
Black Coulommiers.....	" 12.	" 26.	106	33	" ..	7	Branching.	51 6	36	"
Early Etampes.....	" 12.	" 18.	98	30	Weak	7	" ..	50 00	35	"
Golden Giant.....	" 12.	" 20.	100	37	Stiff..	8	Sided.....	48 18	34	Little.
Imported Irish	" 12.	" 3.	83	34	" ..	6	Branching.	44 24	40	None.
Early Blossom.....	" 12.	" 18.	98	34	" ..	7	Half sided.	44 24	37	Little.
Cream Egyptian	" 12.	" 11.	91	38	" ..	7	Sided.....	44 14	41	None.
Welcome.....	" 12.	" 10.	90	38	" ..	7	Branching.	44 4	41	"
White Wonder	" 12.	" 2.	82	36	" ..	9	" ..	44 4	40	"
Improved Ligowo.....	" 12.	" 18.	98	32	Fair..	5	" ..	43 28	37	Little.
Oderbruch.....	" 12.	" 11.	91	33	" ..	7	Half sided.	43 8	37	None.
Poland White.....	" 12.	" 10.	90	34	Stiff..	7	Branching.	43 8	41	"
Bavarian.....	" 12.	" 20.	100	33	Fair..	7	" ..	42 22	38	"
Scottish Chief	" 12.	" 8.	88	34	" ..	8	" ..	42 12	40	"
Flying Scotchman.....	" 12.	" 6.	86	29	Stiff..	8	" ..	42 12	30	"
Siberian.....	" 12.	" 20.	100	32	" ..	7	Half sided.	41 6	37	"
Prize Cluster.....	" 12.	" 6.	86	41	" ..	9 $\frac{1}{2}$	Branching.	36 26	38	"
American Triumph.....	" 12.	" 21.	101	37	" ..	8	" ..	33 18	36	Little.
Golden Prolific.....	" 12.	" 11.	91	29	Fair..	5 $\frac{1}{2}$	" ..	32 12	36	None.
Joanette.....	" 12.	" 18.	98	20	Stiff..	6	" ..	32 2	35	"
Royal Doncaster.....	" 12.	" 18.	98	23	" ..	6	" ..	26 16	37	"

The soil used for oat tests this year was somewhat light in character and for that reason suffered more than it otherwise would have done from drought.

The Abundance, Banner and Rosedale, three of the most prolific varieties last year, are also among the best for yield this year, this is the more noticeable from the fact that the soil was of a different character from that used last season.

Abundance, a comparatively new introduction here, heads the list for productive-ness in the test of varieties, but is surpassed by the Banner in other portions of the farm.

The Abundance is more branching than the Banner and somewhat shorter in the berry, it is white in colour, and has every appearance of being a good milling oat.

White Schonen is another newly introduced branching oat, white in colour, heavier in weight than Banner, very prolific this year and a week later in ripening than that variety.

Wallis, also new here, would be classed as a white oat, but our supply has many gray kernels which would spoil it for milling purposes ; it ripened a few days earlier than Banner and produced ten bushels per acre less.

White Monarch is a second early sided oat with a short plump kernel of a good white colour, fairly prolific and weighs well.

EFFECTS OF BARN-YARD MANURE AS A FERTILIZER.

In last year's report mention is made of a test of barn-yard manure as a fertilizer for wheat, this year the same plots were spring-ploughed and sowed with oats, without further manuring. From the accompanying table it will be seen that the manured plots gave slightly the best yield this year, showing that the effect of the manure extended to the second year.

Name of Variety.	How Manure was applied.	Size of Plot.	Date of Sowing.	Date of Ripen- ing.	Number of days Maturing.	Length of Straw.	Charcter of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
						In.		In.		Bus. lbs.	Lbs
Prize Cluster Oats...	Ploughed in.	$\frac{1}{10}$ acre..	May 18	Aug. 4	78	36	Stiff..	8	Branching	32 10	40
" " ..	On surface...	" ..	" 18	" 4	78	35	" ..	8	"	31 06	40
" " ..	No manure..	" ..	" 1	" 4	78	34	" ..	9	"	28 28	40
			8								

BARLEY, TEST OF VARIETIES.

The yield of barley on the Experimental Farm was smaller this year than usual, this was largely due to the very light soil used for the purpose which was unsuitable for such a dry season.

Beaver, Surprise, Trooper, Royal and Newton are all cross-bred varieties, the first four originated at Ottawa, the three first named are the heaviest barleys grown on the farm this year.

As a number of the varieties were dried up by the excessive hot and dry weather and did not ripen naturally, the dates of ripening given on the tables are only approximate.

Excelsior, Champion and Success are newly introduced varieties quite beardless, all of them are very thin and shrunken in the berry this year, weighing only from 43 to 46 lbs. per bushel, but may improve in this respect in seasons of average rainfall.

All were grown in plots of $\frac{1}{10}$ acre, on summer-fallow ; soil sandy loam, sown with a hoe drill, 8 pecks of seed per acre, not bluestoned, only the Common and Rennie's six-rowed were smutty.

BARLEY, six-rowed, test of varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				In.		In.	Bus. lbs.	Lbs	
Excelsior (beardless).....	May 14	Aug. 6	84	29	Fair.....	3	36 32	46	None.
Mensury.....	" 14	" 3	81	27	Stiff.....	2 ³ / ₄	33 36	46	"
Common.....	" 14	" 3	81	24	".....	2 ¹ / ₄	33 06	46	"
Odessa.....	" 14	" 6	84	26	".....	2 ¹ / ₂	33 06	49	"
Rennie's Improved.....	" 14	" 1	79	24	".....	2	31 42	48	"
Champion (beardless).....	" 14	" 1	79	28	Fair..	2	30 40	43	"
Baxter's.....	" 14	" 1	79	24	Stiff.....	2	30 10	46	"
Phoenix.....	" 14	" 1	79	26	".....	2	28 16	47	"
Petschora.....	" 14	July 30	77	23	".....	2	28 06	45	"
Oderbruch.....	" 14	Aug. 1	79	21	".....	2	27 24	50	"
Trooper.....	" 14	" 11	89	22	Fair.....	2 ¹ / ₂	26 32	50	"
Success (beardless).....	" 14	July 30	77	24	Stiff.....	2	25 00	45	"
Summit.....	" 14	Aug. 11	89	21	Fair.....	2	22 14	51	"
Royal.....	" 14	" 1	79	25	Stiff.....	2 ¹ / ₂	21 12	49	"
Surprise.....	" 14	" 11	89	20	Fair..	2	17 14	51	"

TWO-ROWED, test of varieties.

Beaver.....	May 14	Aug. 18	96	23	Stiff.....	3 ³ / ₄	32 04	51	None.
French Chevalier.....	" 14	" 15	93	25	Fair.....	3 ¹ / ₂	31 22	48	"
California Prolific.....	" 14	" 18	96	27	".....	3	30 40	49	"
Sharpe's Improved Chevalier.....	" 14	" 15	93	23	Stiff.....	3 ³ / ₄	30 10	48	"
Thanet.....	" 14	" 18	96	23	".....	3 ¹ / ₂	29 08	48	"
Duck-bill.....	" 14	" 18	96	21	Fair.....	3	28 46	48	"
Prize Prolific.....	" 14	" 18	96	26	".....	3	27 04	48	"
New Golden Grains.....	" 14	" 18	96	21	".....	3	25 30	49	"
Canadian Thorpe.....	" 14	" 18	96	21	".....	3	24 38	48	"
Danish Chevalier.....	" 14	" 18	96	26	".....	3 ¹ / ₂	23 06	48	"
Newton.....	" 14	" 18	96	25	".....	3	19 08	47	"
Kinver Chevalier.....	" 14	" 15	93	27	".....	3 ¹ / ₂	18 46	48	"

HYBRID BARLEYS.

A number of hybrid varieties of barley were originated at the Central Experimental Farm, Ottawa, by crossing the two-rowed with the six-rowed sorts were tested on the farm this year.

The most promising of these are Pioneer and Bolton, both of which yielded over thirty bushels per acre, the product of these plots has been set aside for further test next year.

For comparison a plot of Thanet barley was sown adjoining these hybrid varieties and is included in the tables. These tests were also made on sandy loam on plots of $\frac{1}{80}$ acre.

HYBRID BARLEYS IN PLOTS OF $\frac{1}{80}$ ACRE.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				In.		In.		Bush. lbs.	lbs.
Pioneer.....	May 14..	Aug. 20..	98	22	Fair... ..	3	6 rowed.....	33 06	50
Bolton.....	" 14..	" 13..	91	29	Stiff.	3	" "	30 10	49
Thanet..	" 14..	" 18..	96	23	" " " " ..	3 $\frac{1}{2}$	" " " " ..	29 08	48
Sidney.....	" 14..	" 27..	105	25	Fair " " " ..	3	" " " " ..	24 18	50
Victor.....	" 14..	" 26..	104	26	" " " " " ..	3 $\frac{1}{2}$	" " " " ..	20 10	50
Stella.....	" 14..	" 11..	89	24	Stiff.....	2 $\frac{1}{2}$	" " " " ..	18 22	48
Type L.....	" 14..	" 26..	104	27	Fair.....	3 $\frac{1}{2}$	" " " " ..	18 22	50
" 10.....	" 14..	" 26..	10 $\frac{1}{2}$	27	" " " " " ..	2 $\frac{1}{2}$	" " " " ..	14 18	49

THE USE OF BARN-YARD MANURE FOR BARLEY.

In dry seasons and on light land, it has always been found on this farm that manure applied to a grain crop either with spring- or fall-ploughing has generally the effect of lessening the yield for the first year, no doubt this is owing to the land being kept too loose, allowing moisture to escape. The past season was no exception to this rule, and the following tables show considerable loss from the use of barn-yard manure, which was well rotted. To avoid this difficulty, manure should be applied the previous winter to land intended for summer-fallow, it is then thoroughly incorporated with the soil before the grain is sown.

Barley was sown with a hoe drill, eight pecks per acre, not bluestoned ; sown on 14th May on plots of $\frac{1}{10}$ acre.

Name of Variety.	—	When Ploughed.	Number of days Maturing.	Length of Straw.	Ripe.	Yield per Acre.	Weight per Bushel.
				In.		Bush. lbs.	lbs.
Odessa	No manure.....	Spring.....	87	27	Aug. '6..	33 16	46
"	Rotted manure.....	Fall.....	77	23	July 30..	29 18	46
"	" " " " ..	Spring.....	87	24	Aug. 6..	28 06	45

FIELD CROPS OF WHEAT AND BARLEY.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
						In.		In.		Bus. lbs.	lbs.	
Red Fife.	Clay loam.	14 acres.	May 4.	Aug. 11.	99	35	Stiff ..	3	Beardless.	29 12	62	None.
Odessa Barley.	" " " "	5 $\frac{1}{2}$ " "	" 18.	" 12.	86	30	" " " "	3	6 row.....	54 44	49	" "

MARKET VALUE PER ACRE OF DIFFERENT GRAIN CROPS.

This subject is creating considerable discussion at present, and it is deemed advisable to give the result of five years' experience on this farm.

The years included in the table are from 1890 to 1894, the crops were all grown on summer-fallow, size of plots one-tenth acre, prices given are those prevailing at this date in Brandon.

Name of Variety.	Average yield for 5 years.		Value per bush.	Value per acre.
	Bush.	lbs.		
Banner Oats.....	78	5	20 cents....	15 63
Red Fife Wheat.....	31	35	42 "	13 26
Odessa Barley.....	54	00	23 "	12 42

PEASE.

This is a crop which deserves special attention in this time of low wheat values, with proper treatment it has always given a profitable return here. It requires strong land free of weeds, summer-fallow preferred, timothy sod broken the previous year is also good for the purpose ; a liberal and deep seeding will be found the most profitable, 2¾ to 3 bushels of the medium sized pease drilled as deep as possible is about right here. So far there has been a steady local demand for pease at good prices, and judging from the number of inquiries received at this farm, a good export trade could be worked up whenever there is a surplus beyond what is required for the home market. The tests reported on in the following table were obtained on clay loam on plots of one-tenth acre each :—

TEST OF VARIETIES.

Name of Variety.	Date of Sowing.		Date of Ripening.	Number of days Maturing.	Quantity seed per Acre.		Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					P'cks	In.				Bus. lbs.	lbs.	
Pride.....	May	1..	Aug. 4..	95	11	35	4	Medium . . .		31 40	63	
Centennial..	"	1..	" 20..	111	11	32	2¾	"		30 50	65	
Mummy.....	"	1..	" 15..	106	11	24	2	"		30 50	64½	
Golden Vine.....	"	1..	" 14..	105	10	25	2½	Small ...		30 20	65	
Prince Albert.....	"	1..	" 16..	107	11	37	2½	Med. to small.		29 50	65	
Crown.....	"	1..	" 6..	97	10	25	2	Small		29 10	65	
Black Eyed Marrowfat..	"	1..	" 20..	111	12	30	3½	Large		29 10	64	
Potter.....	"	1..	" 22..	113	11	42	4	Medium.....		28 10	65	
Canadian Beauty..	"	1..	" 23..	114	11	45	3¾	"		28 00	64	
Multiplier..	"	1..	" 14..	105	10	28	2	Small		25 20	64	

OATS AND PEASE MIXED.

Considerable objection has been made to the general cultivation of field pease, principally from the difficulty and expense of cutting this crop with a scythe, and also from the loss after cutting by wind storms.

To ascertain whether this could be lessened, tests were made last year of sowing about equal parts of oats and pease and reaping the combined crop with a grain binder,

it was noticed then that the mixture containing the least quantities of oats gave the most profitable return.

This year a much smaller quantity of oats has been used and the combined yield from two pecks oats and ten pecks of pease has given a very profitable return, and the grain stood up sufficiently well for the binder to work one way, the sheaves were stooked and no loss was sustained from wind storms and no difficulty experienced in threshing the combined crop with a separator, and any ordinary fanning mill will separate the grain when threshed. The tests were conducted on clay loam on plots of one-tenth acre each.

For the best results a stiff strawed variety of oats ripening at the same date as the pease should be used, and to enable the binder to be set low, the land should be well rolled.

OATS AND PEASE.

Name of Variety.	Seed per Acre.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.	Value per Acre.
	Pck				In.		In.	Bus. lbs.	Lbs	\$ cts. per bus.
Prince Albert Pease	6	May 17	Aug. 18	93	43	Leaning ..	21½	5 00	62	3 75 at 75 cts.
Prize Cluster Oats.....	6	" 17	" 18	93	37	" ..	15	42 22	37	8 52 20 "
										12 27
Prince Albert Pease.....	8	" 17	" 18	93	43	Fair.....	21½	17 30	63	13 12 at 75 cts.
Prize Cluster Oats..	4	" 17	" 18	93	37	"	15½	28 18	40	5 70 20 "
										18 82
Prince Albert Pease.....	10	" 17	" 18	93	43	Stiff.....	21½	20 00	65	15 00 at 75 cts.
Prize Cluster Oats.....	2	" 17	" 18	93	37	"	15	20 20	40	4 12 20 "
										19 12

AVERAGE Yield of Pease for four years.

Name of variety.	Years included.	Average Yield per Acre.	
		Bush.	lbs.
Pride.	1892-93-94	29	30
Potter.....	1892-93-94	29	16
Prince Albert.	1890-92-93-94	29	02
Crown.....	1890-92-93-94	27	50
Golden Vine.....	1890-93-94	27	43
Multiplier.....	1890-92-93-94	27	37
Mummy.....	1892-93-94	27	06
Black Eyed Marrowfat.....	1892-93-94	25	33
Prussian Blue.....	1890-92-93	24	31
Large White Marrowfat.....	1892-93-94	22	55

GRAIN GROWN AFTER POTATOES.

Potatoes grown in close proximity to a railway station are generally a profitable crop here, and another strong point in their favour is that all varieties of grain yield immense crops when sown after potatoes.

It will be seen from the following table that the returns obtained this year from grain sown on potato ground is much higher than from land prepared in any other way. These tests were also conducted on clay loam on one-tenth acre plots.

GRAIN GROWN AFTER POTATOES.

Name of Variety.	Date of Sowing.	Date of Ripen'g.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Proportion Rusted
				in.		in.		Bus. lbs.	Lbs	
Red Fife Wheat....	May 8..	Aug. 15	99	32	Stiff..	3	Beardlss	44 10	63	None.
Banner Oats.	" 8..	" 15	99	36	"	8 $\frac{1}{2}$	Branchg	92 12	39	Badly.
Rye.....	" 8..	" 13	97	38		3 $\frac{1}{2}$		37 18	57	None.
Crown Pease.....	" 8..	" 9	93	36		2		43 00	65	None.

FLAX.

The extremely low prices of wheat prevailing in recent years has led to inquiries into the profitableness of products not very generally grown throughout the province. Flax is one of the most promising of these, its growth has been mainly carried on in the Mennonite settlement in Southern Manitoba, where it has been grown to a large extent for a number of years. While the price of nearly all the staples grown by farmers here have fallen, the value of flax has been well maintained, realizing usually from seventy-five cents to one dollar per bushel, the present price is \$1.10 per bushel.

Six plots have this year been devoted to flax, three to gain information regarding the proper time to sow, and three to ascertain the most profitable amount of seed to sow.

Although the rainfall was too small for the best results, it will be seen that this product promises to be quite profitable even in a dry year.

For comparison plots of both red and white wheats were sown adjoining the flax and under the same conditions, it will be seen from the accompanying tables that flax is by far the most profitable crop.

It was sown with a common hoe drill and cut with a grain binder without difficulty, the sheaves were threshed with the ordinary separator, care being taken to feed slowly.

As the flax plant is not vigorous in the early stages of its growth, only clean land should be used, preferably summer-fallow or backsetting, otherwise weeds will greatly reduce the yield.

As much of the flax seed offered for sale contains a large proportion of noxious weeds, principally wild mustard and false flax, care should be exercised when purchasing it for seed.

The plots used for flax will be sown with different kinds of grain next spring, and thus some information may be gained as to its effect on the land in the way of exhaustion. The plots sown were one-tenth acre each, and the soil clay loam.

As a large proportion of the millet seed used in this country is imported, it was deemed advisable to test the growing of it here. From the accompanying table it will be seen that at the prevailing price of one dollar per bushel, it is a very profitable crop.

COMMON MILLET GROWN FOR SEED.

Soil, black sandy loam, after potatoes ; sown with a grain drill :

Variety.	When Sown.	Amount seed per Acre.	When Cut.	Weight per Bushel.	Yield of seed per Acre.	Value at \$1.
		Lbs.		Lbs.	Bush. lbs.	\$ cts.
Common Millet.....	May 11..	23	Aug. 15..	51	29 38	29 79
“	“ 11..	45	“ 15..	50	27 09	27 18
“	“ 19..	23	“ 13..	50	21 22	21 45

GRASSES AND FODDER PLANTS.

The very dry spring weather prevailing during the past two years has made it almost impossible to get a catch of grass when the seed is sown with grain, and the only successful plan here has been to sow grass seed in August on land prepared as for summer-fallow ; stubble land is ploughed early in June and cultivated on the surface until about the 15th August, when the grass seed is sown on the bare fallow and harrowed in, this plan has never failed to give a good stand of grass even in the driest season.

If the grass seed is not sown earlier than the above date, the weeds which always come up freely will be cut down by frost before they ripen, leaving the grass clean the following season.

Five varieties of grass were sown on bare fallow in 1893, size of the plots varied from one-quarter acre to three acres ; owing to the very dry season and the light character of the soil the yields were not large.

All the plots sown with native varieties were free from weeds, but for some reason the Austrian Brome grass was somewhat weedy, and none of it could be kept for seed. Ten pounds of seed per acre of each variety was used ; 15 pounds would have been better.

As an indication of their comparative value for spring and fall pasture, the height on 1st May and amount of aftermath is given :

Name of variety.	Yield per Acre.	Height 1st May.	Amount of Aftermath.	Remarks.
	Lbs.			
American Rye Grass (E. Americanus).....	2,022	5 inches...	Very little..	Bearded head.
Bald Wheat Grass (A. tenerum).....	1,916	4 “ ...	None.	Quality good.
Bald Rye Grass (E. Virginicus).....	1,407	5 “ ...	Very little..	Quality good.
Austrian Brome (B. inermis).....	1,668	6 “ ...	Good all fall	Wide leaves.
Drop seed or Wild Timothy (M. glomerata)	1,391	Not started	A little.....	Quality choice.

MIXED GRAIN FOR FODDER.

Variety.	Bushel per acre Sown.	Date of Sowing.	How Sown.	When Cut.	Weight per Acre.	
					Green.	Dry.
					Tons. lbs.	Tons. lbs.
1 { Pease, Prince Albert.	1	May 17..	Hoe drill	July 28..	5 1,900	2 500
Wheat, Red Fife	1	" 17..	"	" 28..		
Oats, Banner	1	" 17..	"	" 28..		
2 { Pease, Prince Albert.	1	" 17..	"	" 28..	6 00	2 950
Barley, Prize Prolific	1	" 17..	"	" 28..		
Oats, Banner	1	" 17..	"	" 28..		

FODDER CORN.

Corn, in common with all fodder crops, has suffered severely by the past summer's drought, and the yield is below the average, but is still sufficiently large to make it the most profitable of all forage crops, and it should be more cultivated, especially on the lighter soils of the province. Owing to the very warm dry summer and open fall, a large proportion of the ears ripened on an early sown 10-acre field of North Dakota Flint, about 30 bushels of this was saved for seed, and if wintered safely will be sown next year with the hope that it may produce in time an earlier ripening strain of that variety.

It will be noticed that Longfellow corn gave the largest return of fodder, but it is somewhat later than the North Dakota flint.

Rural Thoroughbred White Flint, the next in productiveness, is a popular ensilage corn in the east, but is altogether too late for this province; taking everything into consideration the North Dakota flint is still the most promising variety for this section.

Mitchell's Extra Early, the earliest of the varieties tested for fodder, gives too small a return for this purpose, but is as early as the native squaw corn, and has larger ears, and should replace it for table use.

It is noticeable that sowing in drills gave the best returns in every case.

TEST OF VARIETIES.

Sown after corn, 10 loads of manure ploughed in the fall; size of plots one-tenth acre, soil sandy loam; sown on 21st May with a press drill, drills 3 feet apart, plants 1 foot apart in the drill, also in hills 3 feet apart each way; kept clean with a Breed weeder and one horse cultivator; cut on 5th September and immediately weighed.

CORN.

Name of Variety.	Date of Sowing.	Height.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per acre grown in rows.	Weight per acre grown in hills.
		in.						Tons lbs	Tons lbs
Longfellow.	May 21	70	July 31	Aug. 7	Aug. 17	Aug. 25	L. milk.	18 740	12 200
Rural Thorobred White Flint.	" 21	65	Aug. 23	Sept. 3	"	"	Silk. . . .	15 140	10 680
North Dakota Flint.	" 21	65	July 25	Aug. 4	Aug. 13	Aug. 23	Glazed .	13 400	11 . . .
Angel of Midnight.	" 21	59	Aug. 1	" 8	" 17	" 25	L. milk.	12 640	10 240
Compton's Early.	" 21	69	July 27	" 7	" 17	" 23	"	12 200	7 300
Smut Nose.	" 21	67	" 29	" 2	" 12	" 23	"	10 1,346	9 1,800
Pearce's Prolific.	" 21	62	" 27	" 2	" 14	" 23	"	9 1,800	7 300
Gold Medal Dent.	" 21	61	Aug. 2	" 7	" 17	"	Ey. milk.	9 1,140	7 300
Livingston's.	" 21	64	" 1	" 5	" 17	Sept. 4	L. milk.	8 1,600	7 1,400
Mitchell's Extra Early.	" 21	51	July 20	" 1	" 7	Aug. 17	Ripe. . .	7 300	4 1,900

SUNFLOWERS AND HORSE-BEANS.

Sunflowers sown 22nd May, in rows 3 feet apart and 1 foot apart in the row, yielded 13,200 pounds per acre of ripe heads on 11th September.

Horse-beans sown 22nd May in rows 3 feet apart, plants 6 inches apart in the row ; yielded on 11th September, 2,640 pounds per acre of combined stalks and grain.

SILOS.

The ensilage made last year from corn and sunflowers proved to be all sound and sweet to the bottom of the silo, this year one silo was again filled, and the corn being well matured, the ensilage is the best we have ever had on this farm.

Judging from the four years' test of silos here, they are when placed in a bank barn a decided success, and now that lumber can be obtained at a more reasonable price than formerly, no doubt many will be erected.

FIELD ROOTS.

In former years only two sowings of each kind of field roots were made ; this year, for the purpose of testing very early sowing, three plots were sown, each of them a week apart. The earliest sown as usual has given the largest yield, this was no doubt largely due to the very dry summer. It would appear, however, from the experience of several years, that even in an average season, the root crop should be sown two weeks earlier than in Ontario.

In addition to the usual tables, others have been prepared showing the general average for each sowing, also, the average of each variety for the three sowings.

It will be seen that East Lothian turnip, Mammoth Long Red mangel and Half Long White carrots gave the best average yield. Also, that the first sown turnips yielded a third more than the last sown, the first sown mangels and carrots nearly doubled the last sown.

TURNIPS.

Yield of turnips sown at three different dates ; on millet stubble, land manured and ploughed in the fall ; seed drilled in on flat drills 30 inches apart ; pulled 9th October. Soil sandy loam : estimate of yield made from product of one row 66 feet long. The first plots were sown on the 8th of May, the second series 15th May and the third 22nd May and all were pulled 9th October.

ROOTS—TURNIPS.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 3rd Plot.		Yield per Acre. 3rd Plot.	
	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
Selected Purple Top.....	22	880	748		13	1,720	462		8	630	277	12
Westbury Improved.....	20	920	682		11	1,232	387	12	13	400	440	
Bloomsdale Swede	20	920	682		13	664	444	24	9	1,800	330	
Selected East Lothian.....	20	920	682		13	400	440		25	1,744	862	24
Champion Purple Top.....	20	392	673	12	13	1,456	457	36	12	1,080	418	
Marquis of Lorne.....	20	128	668	48	10	856	347	36	7	784	246	24
Prize Purple Top.....	19	544	642	24	15	360	506		19	280	638	
Skirving's Selected.....	19	16	633	36	10	328	338	48	7	256	237	36
Snow White Globe.....	18	696	611	36	9	744	312	24	12	288	404	48
Jumbo or Monarch.....	17	584	576	24	12	1,608	426	48	14	1,040	484	
Carter's Elephant.....	16	1,264	554	24	14	512	475	12	14	512	475	12
Giant King.....	15	888	514	48	17	1,112	585	12	14	1,040	484	

TURNIPS—General average for three sowings.

	Average per Acre.	
	Bush.	Lbs.
Sowing of May 8.....	639	6
“ “ 15.....	431	56
“ “ 22.....	441	28

SUMMARY.

Name of Variety.	Average Yield for three Sowings.	
	Bush.	Lbs.
Selected East Lothian.....	661	28
Prize Purple Top.....	595	28
Giant King.....	528	00
Champion Purple Top.....	516	16
Westbury Improved.....	503	4
Carter's Elephant.....	501	36
Selected Purple Top.....	495	44
Jumbo or Monarch.....	495	44
Bloomsdale Swede.....	485	28
Snow White Globe.....	442	42
Marquis of Lorne.....	420	56
Skirving's Selected.....	403	20

MANGELS.

Yield of Mangels sown at three different dates. The first set of plots were sown 8th May, the second 15th May and the third 22nd May, and all were pulled 21st September, sown on millet stubble, land manured and ploughed in the fall; flat drills 30 inches apart. With one exception the earliest sown gave the best yield in each variety. The quality of the roots was excellent. The yields have been estimated from the product of one row 66 feet long.

Name of Variety.	Yield per Acre.											
	1st Plot.		1st Plot.		2nd Plot.		2nd Plot,		3rd Plot.		3rd Plct.	
	Tons. Lbs.	Bus. Lbs.	Tons. Lbs.	Bus. Lbs.	Tons. Lbs.	Bus. Lbs.	Tons. Lbs.	Bus. Lbs.	Tons. Lbs.	Bus. Lbs.		
Mammoth Long Red.....	27	648	910	48	24	1896	831	36	20	128	668	48
Selected Long Red.....	26	1064	884	24	20	656	677	36	18	168	602	48
Canadian Giant.....	24	840	814	00	12	288	404	48	10	1120	352	00
Mammoth Long Red.....	22	1936	765	36	20	920	682	00	13	1984	466	24
Improved Mam. Prize Long Red.....	22	1408	756	48	21	1032	717	12	8	632	277	12
Gate Post.....	22	880	748	00	21	240	704	00	10	856	347	36
Golden Tankard.....	19	280	638	00	12	816	413	36	9	480	308	00
Warden Orange Globe.....	19	16	633	36	23	464	774	24	10	1120	352	00
Giant Yellow Intermediate.....	17	848	580	48	13	400	440	00	6	1464	224	24

MANGELS—General average for the three sowings.

	Average per Acre.	
	Bush.	Lbs.
Sowing of May 8.	748	00
“ “ 15.	627	14
“ “ 22.	399	54

SUMMARY.

Name of Variety.	Average Yield for three Sowing.	
	Bush.	Lbs.
Mammoth Long Red	803	44
Selected Mam. Long Red	721	36
Mammoth Long Red	638	00
Gate Post.....	599	52
Warden Orange Globe.....	586	40
Improved Mam. Prize Long Red	583	44
Canadian Giant.....	523	36
Golden Tankard.....	453	12
Giant Yellow Intermediate.....	415	4

CARROTS.

Yield of carrots, sown on very deeply fall ploughed land, millet stubble ; barnyard manure applied in the fall ; flat drills 18 inches apart. The first plots were sown on 8th May, the second series on 15th May and the third 22nd May, and all were pulled 22nd September. The yields have been calculated from the product of one row 66 feet long.

Name of Variety.	Yield per Acre.											
	1st Plot.		1st Plot.		2nd Plot.		2nd Plot.		3rd Plot.		3rd Plot.	
	Tons.	Lbs.	Bus.	Lbs.	Tons.	Lbs.	Bus.	Lbs.	Tons.	Lbs.	Bus.	Lbs.
Half Long White	16	120	535	120	15	800	513	20	7	1,400	256	40
Improved Short White.....	14	600	476	40	14	160	469	20	9	1,580	326	20
Mammoth White Intermediate.....	14	600	476	40	14	160	469	20	8	500	275	
Improved Half Long White.....	13	840	447	20	13	400	440		10	680	344	40
St. Valery	13	400	440		6	1,200	220		4	1,020	150	20
White Belgian.....	11	1,320	388	40	9	40	300	40	8	1,160	286	
Guerande.....	11	440	374		10	1,120	352		8	1,380	289	40
Giant Short White Vosges	11		366	40	10	680	344	40	9	40	300	40
Carters Orange Giant.....	11		366	40	10	680	344	40	5	560	176	
Half Long Stump rooted.....	10	680	344	40	6	1,640	227	20	3	820	113	40
Early Gem.....	9	1,800	330		9	40	300	40	6	1,200	220	
Iverson's Champion.....	9	920	315	20	9	40	300	40	7	80	234	40

CARROTS—General average for the three sowings.

		Average per Acre.	
		Bush.	Lbs.
Sowing of May 8.....		405	10
“ “ 15.....		356	53
“ “ 22.....		247	48

SUMMARY.

Name of Variety.	Average Yield for three Sowings.	
	Bush.	Lbs.
Half Long White.....	435	6
Improved Short White.....	424	6
Improved Half Long White.....	410	40
Mammoth White Intermediate.....	407	
Guerande.....	338	33
Giant Short White Vosges.....	337	20
White Belgian.....	325	6
Carter's Orange Giant.....	295	46
Early Gem.....	283	33
Iverson's Champion.....	283	33
St. Valery.....	270	6
Half Long Stump Rooted.....	228	33

SUGAR BEETS.

Yield of sugar beets. Treated the same as mangels. The first plots were sown on 8th May, the second series on 15th May and the third 22nd May, and all were pulled on 21st September. In every case the earliest sown gave the largest return. We find the sugar beet very useful for feeding calves ; they are more readily eaten by young animals than mangels. The yield in these tests has been calculated from the product of one row 66 feet long.

Name of Variety.	Yield per Acre.					
	1st Plot.		1st Plot.		2nd Plot.	
	Tons. Lbs.	Bus. Lbs.	Tons. Lbs.	Bus. Lbs.	Tons. Lbs.	Bus. Lbs.
French Red Top Sugar.....	20 1712	695 12	11 1760	396	10 1120	352
Vilmorin's Improved.	19 280	638	6 1992	233 12	6 408	206 48
Klein Wanzleben.....	15 360	506	7 1840	264	7 784	246 24

CATTLE.

I regret that owing to the prevalence of tuberculosis among our cattle it has been found necessary to slaughter during the summer the larger portion of the farm herd. For this reason very few experiments with cattle have been undertaken of late. The cattle that survived the test are in apparent good health and it is believed that the disease has been stamped out ; the barn has been thoroughly disinfected.

FEEDING COWS.

Many inquiries are received from farmers regarding the comparative amount of food consumed by the different breeds of cattle.

With a view of obtaining some information on this point, two cows of each of the breeds kept on this farm were placed in double stalls and fed all they would eat up clean of the following ration :—

40 lbs. Corn ensilage.
 36 " Cut wheat straw.
 12 " Frozen wheat chop.
 3 " Barley chop.

Any food left in the mangers was deducted from the amount charged to each breed. As the beef breeds were dry and the dairy breeds in full milk they are reported on separately.

All were supposed to be in calf.

BEEF BREEDS.

Name.	Breed.	Con- dition.	Age.	Weight April 7.	Weight May 7.	Amount of feed consumed.	Loss or gain in weight.
				Lbs.	Lbs.	Lbs.	
Rose of Darlington	Shorthorn..	Dry. . .	4 years	1,545	1,625	} 1,480	Gain, 80 lbs.
Rose of Sydenham.....	"	"	8 "	1,725	1,760		" 35 "
Violet.	Galloway..	"	8 "	1,330	1,355	} 1,208	" 25 "
Hannah	"	"	6 "	1,235	1,260		" 25 "

DAIRY BREEDS.

Name.	Breed.	Con- dition.	Age.	Weight April 7.	Weight May 7.	Amount of feed consumed.	Loss or gain in weight.
				Lbs.	Lbs.	Lbs.	
Queen.....	Holstein ..	Full m'k	6 years	1,160	1,160	} 1,584	Neither.
Leda.....	"	"	5 "	1,420	1,460		Gain, 40 lbs.
Dandy, 2nd.....	Ayrshire...	"	5 "	1,155	1,120	} 1,359	Loss, 35 "
Jewel, ".....	"	"	5 "	1,190	1,195		" 85 "

YIELD OF MILK FROM THE DIFFERENT BREEDS OF CATTLE.

In view of the many inquiries regarding the quantities of milk given by the dairy breeds kept at this farm, returns are given showing the quantity of milk obtained from two of the cows of each of the dairy breeds. The dates selected were the milking periods of the cows between August, 1892, and October, 1893.

There are several circumstances which would prevent this from being a reliable comparative test of milking qualities of the different breeds, and it is not intended for that purpose. No test of this sort can be taken as accurate when applied to the different breeds in a general way, since individual animals of the same breed vary so much in their power of milk production.

The cows were fed moderately on corn ensilage, cut wheat straw and a little mixed chop in winter and on fairly good native grass pasture during the growing season.

Having no Babcock tester at the time, the amount of butter fat of the milk cannot be given. Since then a tester has been procured which will be used in such tests in future.

All the cows were young, and since then the yields from all of them have greatly increased.

Name.	Breed.	Age.	Days actually giving milk.	Lbs. of milk.
Leda.....	Holstein..	4 years....	324	10,155
Queen.....	"	5 "	271	8,604
			595	18,759
Dandy.....	Ayrshire..	4 years....	334	6,693
Jewel.....	"	4 "	270	5,291
			604	11,984

POULTRY.

The poultry house on the Experimental Farm is a frame building 16 x 32 feet, the spaces between the studs are filled with broken bricks laid in mortar ; although sufficiently warm to keep the combs of the fowls from freezing, it is not warm enough to make fowls tender.

The runs in connection with the poultry house being finished, on March 15th, pens of the following breeds of fowls were made up, Barred Plymouth Rocks, White Leghorns and Light Brahmas.

The following table shows the average number of eggs laid per bird of each breed of fowls from 1st April to 31st October :

Breed.	April.	May.	June.	July.	August.	September.	October.	Total.
	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.
Barred Plymouth Rock....	10 $\frac{1}{3}$	16 $\frac{1}{2}$	10 $\frac{2}{3}$	17	11 $\frac{1}{2}$	15	5	86
White Leghorn.....	10 $\frac{1}{2}$	11 $\frac{1}{2}$	20	20	12	.....	.....	74
Light Brahma.....	10	11	9	.....	1	5	2	38

NOTE.—Brahmas were found to have been kept too fat for the best results, and in future will be kept on shorter allowance.

Some of the cross-bred hens began eating their eggs in February, the habit was acquired through the breaking of their thin shelled eggs, a cure was effected by using nest boxes with false bottoms, the egg as soon as laid falling through a hole in the bottom of the nest on a slanting piece of canvas. This proved a perfect remedy and there has been no further loss from this cause.

Considerable difficulty was experienced with soft shelled eggs. This we believe has been remedied during the present season by feeding ground bone, and by giving the hens plenty of exercise in every possible way.

Owing to the difficulty in getting broody hens, settings were not made until May, others were also made during June and July. June hatchings gave rather the best results.

The following are the live weights reached by fowls of the different breeds.

Variety.	Age.	Weight.	
Barred Plymouth Rock, cock.....	18 months.	9 lbs.	10 oz.
“ “ cockerel.....	3½ “	5 “	8 “
“ “ hen.....	18 “	8 “	“
“ “ pullet.....	4 “	4 “	5 “
White Leghorn, cock.....	18 “	4 “	4 “
“ cockerel.....	4 “	3 “	8 “
“ pullet.....	4 “	3 “	4 “
Black Minorca, cockerel.....	4 “	6 “	“
“ pullet.....	4 “	3 “	10 “
Light Brahma, cock.....	2 years.	11 “	“
“ hen.....		8 “	8 “

Insects were destroyed by removing the fowls, and setting fire to a pound of sulphur in an iron receptacle and closing the building tightly for four or five hours.

Grit and water was kept at all times before the fowls when in confinement and any dry grain fed them was mixed with the straw chaff which always covered the floor of their house, the search for this gave the fowls exercise.

Hens purchased from a neighbouring farmer were found to be infested with scaly leg, this was cured by brushing the legs with coal oil, two applications; a week apart being found sufficient.

HORTICULTURE.

APPLES.

Apple trees suffered more last winter than on any preceding year, many of the trees planted in the spring of 1893 being killed root and branch, more particularly those in the orchard on the hill side. No doubt this result was largely due to the snow being swept away by winds. Some of this consignment of trees were planted promiscuously in the forest tree shelter belt and receiving the benefit of snow drifts survived, although badly damaged by frost.

Below is a list of survivors of this set of trees :—

Saccharine,
Sugar Sweet,
White Pigeon,
Titovka Koslov,
Polumiron,

Silken Leaf,
Winter Stripe,
Round Borsdorf,
Grandmother,
Borsdorf,

The trees killed root and branch are :

Hare Pipka,
Little Hat,
Persian Bogdanoff,
Charlamoff,
Miron Grell,
Orel No. 27,
Orel No. 5,
Red Streaked,
Cinnamon Pine,
Plodovitka,

Karabovka,
Golden Reinette,
Simbirsk No. 11,
Simbirsk No. 3,
Simbirsk No. 5,
Early Sweet,
Green Crimean,
Arabka,
Rambour Reinette.

The thirty-one Russian apple tree seedlings protected by scrub which have stood for four winters, are still alive, but are more or less injured each year by frost.

The Anis apple trees planted in the valley in 1890 and protected by a maple hedge are still alive, but are making no progress, the growth of each summer is cut off the following winter, and the trees are no higher than they were three years ago; were it not for the heavy drifts covering them each winter they would no doubt be killed to the ground before this.

CRAB APPLES.

For two or three years the Transcendent crab apple trees on this farm were quite promising, and a few of them bore fruit, but the past two winters have been very severe on them and nearly all were killed to within a short distance of the ground.

Siberian, Whitneys No. 20, Hyslop, Orange, Early Strawberry and Queen's Choice are still alive, but badly cut back.

Ten additional Transcendents were planted 5th May, 1893, eight of these are still alive, but badly injured.

PLUMS.

I take pleasure in reporting a fair share of success with the native plum, the seven native wild plum trees procured from the Brandon Hills and planted in 1890, show the advantage of cultivation, they have made good trees, and this year were loaded with fruit, which varies very much in size and quality, some were found to make excellent preserves, the pits of all were saved, some of them being planted in the fall, the remainder packed in sand for spring sowing. Several of the native plum trees planted in 1893 also bore fruit.

Four native yellow plum trees were received from the Antlers district, and will prove useful for comparison with the red ones already grown here.

Bradshaw, DeSoto, Nicholas and Late Red, all imported varieties, are still in existence, although very poor specimens, being badly injured by frost each winter, the DeSoto is, however, the most promising.

Two varieties were received from the nursery of A. Dupuis, Village des Aulnais, Quebec, consisting of Orleans Blue and Imperial Blue, and planted spring of 1893, these all started, but were entirely killed by frost the following winter.

The following seedlings, viz., 127 Weaver, 12 Cheney, 8 Speer, 6 DeSoto, and 34 Natives, were received from the Central Experimental Farm last spring, and were planted in permanent positions with a southern exposure, and sheltered on the east and west by two year old maple hedges: these are all alive and thrifty at this date.

The native plums on this farm proving so successful, 86 additional young trees were procured this fall from the plantation of Mr. Thomas Frankland, of Stonewall: these are heeled in for the winter, and will be planted next spring.

CHERRIES.

The standard cherries tested up to this date have not proved a success, some specimens of the Bessarabian, Lutovka, 6 m. Cherry, Koslov Bush Morello, Vladimir, and Blackhill Cherry, are still alive, but are repeatedly cut back each winter, none of them have as yet borne fruit.

In the spring of 1893 some specimens of the sand cherry, "*Prunus pumila*," both imported and native, were planted. These have come through the winter uninjured by frost and have proved vigorous and hardy; they not only bear a large amount of rather inferior fruit, but are also handsome shrubs when in bloom. A plantation of 200 of these shrubs sent from the Central Farm has been set out in the valley, and although planted late withstood the drought remarkably well, and are all alive and healthy at this date.

Two varieties of cherries were received from Mr. A. Dupuis, Village des Aulnais, Quebec:—Old French and Montmorency, these were fresh root grafts, and the grafts had become disunited in transit, hence they did not grow.

Below will be found a list of cherries which were received last spring from the Central Experimental Farm, and were planted in the valley in the shelter of maple hedges, many of these were very small and did not survive the drought of the summer, but all the varieties are still represented in the plantation.

Brusseler Braun,	Griotte du Nord,
Bessarabian, on Mazzard stock,	Ostheim seedlings,
do seedlings,	Minnesota Ostheim seedlings,
Orel 23 on Mazzard stock,	Common English do
Orel 24,	Lithaur Weichsel do
Lutovka,	Vladimir do
Shadow Amarelle	Carnation do

WILD CRAB OF SIBERIA.

After four years' trial, the Siberian crab (*Pyrus baccata*) has proven hardy here, trees both in the open and in the shelter of forest tree belt have never been cut back by frost, and this year we have the pleasure of reporting that some of the trees fruited, the seed of these was carefully saved and planted. The fruit of this crab is too small to be of commercial value, but if it continues hardy, the tree will be useful as a propagating stock, and the fruit for jelly. Twenty more of these trees and five other varieties of *Pyrus*, viz., *Pyrus baccata sanguinea*, *Pyrus b. genuina*, *Pyrus b. cerasiformis*, *Pyrus b. prunifolia*, and *Pyrus b. macrocarpa*, were planted this season, and will be reported on later.

SUMMARY OF FIVE YEARS' EXPERIENCE WITH LARGE FRUITS :

Apples.—None of the 300 varieties tested on this farm have proved hardy, the most promising is the Anis apple, and it kills back badly each winter.

Crab Apples.—None of the varieties of crab apples have proved hardy with us, the most promising is the Transcendent.

Cherries.—All the imported cultivated varieties of cherries tested have proved too tender for this climate. The native sand cherry, *Prunus pumila*, is promising as a starting point.

Plums.—The DeSoto is the most promising imported plum; the native Manitoba plums are full of promise, and are worthy of more general cultivation.

CURRANTS.

There are 32 varieties of currants growing on this farm, of these 20 are named, the remaining 12 are seedlings originated at the Central Experimental Farm, these bore fruit here for the first time this season.

Of the named black varieties, Lee's Prolific still heads the list as a useful berry for general cultivation, closely followed by Black Naples and Black Champion, the latter is a vigorous grower, but a shy bearer, fruit has a decided woody flavour.

Of the red currants, Fay's Prolific, Ruby Castle, Red Cherry and Victoria are listed in their order of merit and fruited well considering the season.

The White Grape also gave a fair yield of fine fruit.

The following new varieties fruited the past season for the first time :—

Ogden's Black.—Yield small; size large; very acid.

Prince of Wales, Black.—Yield small; flavour poor; size small; growth of wood weak.

Baldwin Black.—Yield fair; size medium to large; ripens late.

NEW RED CURRANTS.

La Conde.—Yield fair ; size large ; flavour fair.

La Hative.—Size small ; quality poor.

La Fertile.—Size large ; yield large : flavour good ; ripened evenly.

Red Dutch.—Heavy crop of fine fruit ; flavour good ; ripened evenly.

Knight's Red.—Yield fair ; flavour poor ; very early.

New Red Dutch.—Small and sour.

White Transparent.—Size medium to large ; yield fair ; flavour good.

The unnamed seedling currants are as follows :—

Record number	$\frac{1}{6}$	Black.—Flavour acid, poor ; size medium ; yield fair ; very early ; vigorous growth.
do	$\frac{1}{3}$	Black.—Flavour good ; ripening evenly ; earlier than Lee's Prolific.
do	$\frac{2}{81}$	Black.—Flavour woody ; size small ; yield good ; early.
do	$\frac{1}{83}$	Black.—Size small ; yield very poor ; generally poor.
do	$\frac{1}{8}$	Black.—Size medium to small ; flavour good ; yield fair.
do	$\frac{1}{66}$	Black.—Size small ; flavour good ; yield poor ; growth small.
do	$\frac{1}{54}$	Black.—Flavour very acid ; yield poor ; growth small.
do	$\frac{1}{17}$	Black.—Yield fair ; flavour good ; size medium to large ; growth vigorous.
do	$\frac{1}{46}, \frac{1}{12}, \frac{1}{15}, \frac{1}{16}$	have not yet borne fruit.

GOOSEBERRIES.

Nineteen varieties were received from the Central Farm, imported from England in the spring of 1893, and planted in shelter plots on the hillside. These consisted of two each of the following varieties: Whenham's Industry, Lancashire Lad, Warrington, Bonnie Lass, Leader, Pitmaston Green Gage, Green Overall, White Champagne, Red Champagne, Companion, Improved Early Hedghog, Crown Bob, Early Sulphur, Dublin, Bobby, Leveller, Whitesmith, Queen Victoria and Governess. In the fall of that year they were found to be healthy and to have become thoroughly established, but the following spring all had succumbed to the severity of our winter.

The Houghton and Smith's Improved still continue hardy and are recommended for general culture in this province, the Houghton is the most prolific, bearing a crop nearly every year, the fruit is small but excellent both raw and preserved. Smith's Improved is larger in size but the bush is a shy bearer here.

The native gooseberry is found to improve greatly under cultivation, with careful pruning large quantities of small but fair flavoured fruit may be produced.

RASPBERRIES.

The yield of all kinds of raspberries was very small this year owing to excessive dry hot weather just as the fruit was forming.

There are fifteen varieties of this fruit at present under test here ; they are as follows :—

Red,—Turner, Philadelphia, Cuthbert, Dr. Reeder, Marlboro, Taylors's Prolific, Saunders seedlings, Sarah, $\frac{3}{74}$ and $\frac{3}{7}$.

Caroline and Golden Queen,—Yellow, Hilborn,—Blackcap, Nevada, Gainor and Wachusett Thornless—Blackberries.

All tender varieties were laid down and covered with earth before winter set in, and were found to be in excellent condition when uncovered in the spring. The Turner having withstood previous winters was not protected and was only slightly killed back.

The Philadelphia was also left unprotected and proved to be the hardiest variety under cultivation here.

Some of all varieties have been laid down the present winter, and notes will be taken of their condition during next season.

The Turner and Philadelphia of the red, the Caroline of the yellow, and the Hilborn of the black varieties respectively still sustain their reputation for general usefulness here.

The three seedling raspberries mentioned in last year's report, viz., Record numbers Sarah, $\frac{2}{7}$ and $\frac{3}{7\frac{1}{4}}$ were multiplied by suckers. Sarah has proved itself very promising, seems to be fairly hardy, producing a fair crop of large red berries ripening late. $\frac{3}{7\frac{1}{4}}$ is hardy, $\frac{2}{7}$ is tender and needs protection.

STRAWBERRIES.

The strawberries now growing on this farm, are Crescent, Wilson, New Dominion, Parker Earle, Windsor Chief and Pineapple, these produced but a small amount of fruit this season owing to the drought, but there are a fine lot of young plants which will be utilized in forming new beds next spring.

Twenty-five additional varieties were received from the Central Experimental Farm in September, 1893, these were planted immediately and well watered but frost coming soon after, they perished before becoming established. It seems useless to attempt growing strawberry plants here by planting in the fall: the autumn is usually very dry and the plants have not time to get established before frost sets in.

HUCKLEBERRIES.

Ten bushes of huckleberries were received from Iowa and planted in 1893, all started to grow, but this fall only three were alive, these are not promising and will probably succumb during the present winter.

QUINCES.

Ten Japan Quince was added to our list of fruits in 1893, these were presented to the farm by Dr. D. H. Harrison, Neepawa, they made fair growth but do not promise to be hardy here.

FORESTRY.

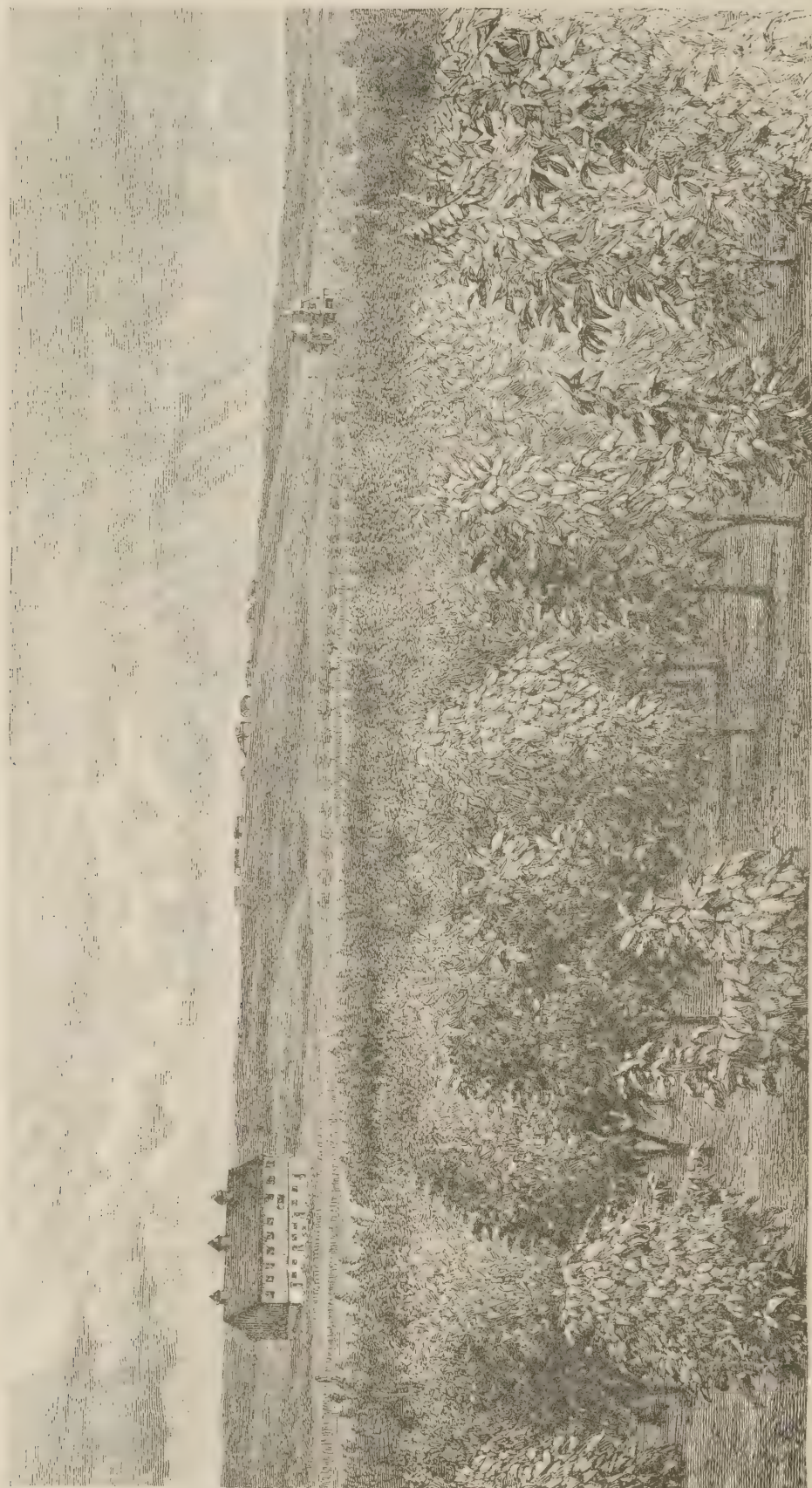
FOREST TREE SHELTER BELT.

This belt is situated on the west boundary of the farm and consists of twenty-one rows 4 feet 6 inches apart, and 775 feet long, the trees are planted 4 feet 6 inches apart in the rows.

Planting was commenced in 1889 and completed in 1890, but during each of these years a number of the trees died, these were replaced but since 1892 very few trees have died.

Some of the trees have grown quite large and last summer it became necessary to cut back some of the rank growers to make room for the slow growing and evergreen varieties.

The accompanying view represents a portion of this shelter belt near the western boundary of the farm.



View of part of Shelter belt planted in 1889 on western boundary of Farm.

The following list gives the height and spread of branches of the several varieties, also remarks as to their suitability for shelter belts.

The belt has been kept clean with a one-horse cultivator each year since planting commenced.

Variety.	Maximum height in feet.	Spread of branches in feet.	Remarks.
	Ft.	Ft.	
Oak, mossy cup.....	6	3	Hardy, slow grower, a native.
Ash, white, <i>Fraxinus Americana</i>	4	1	Tender, not suitable for this province.
“ black, <i>F. sambucifolia</i>	8	4	Hardy and useful—useful wood.
“ red, <i>F. pubescens</i>	7	2	“ “ “
“ green, native.....	9	3	Slow of growth, hardy, useful wood.
Mountain Ash, American.....	8	3	Sun-scalds, not desirable.
“ European.....	8	3	“ “ “
“ Manitoba			Hardy, promising.
<i>Caragana arborescens</i>	6	6	A pretty flowering shrub, quite hardy.
<i>Artemisia Abrotanum</i>	6	4	Very useful for bleak places.
Spruce, white (native), <i>Picea alba</i>	6	4	A handsome tree, hardy.
“ Norway, <i>Picea excelsa</i>	5	3	Half hardy, requires protection.
“ White (Ontario), <i>Picea alba</i>	3	1	“ “ “
Cedar, <i>Arbor-vitæ</i>	3	4	Slow grower, quite ornamental.
Pine, Scotch, <i>Pinus sylvestris</i>	7	3	Hardy only under protection.
“ Austrian, <i>Pinus Austriaca</i>	6	3	“ “ “
“ Riga.....	Small.		Hardiness uncertain, promising.
Larch, European.....	6	4	Handsome and hardy.
“ Manitoba.....	8	4	“ “ “
Laurel-leaved willow.....	7	4	Large laurel-like leaves, hardy.
French, laurel-leaved willow.....	7	3	Sun-scalds badly.
Ash-leaved maple, native.....	14	10	A good wind break, rapid grower.
Silver-leaved maple, <i>A. dasycarpum</i>	6	2	Not desirable, winter kills.
Norway maple.....	3	1	Very tender, no good here.
White Native Elm, <i>U. Americana</i>	6	4	Very hardy, slow grower, handsome.
White Elm Imported, “.....	3	2	Tender, no use here.
Imported White Birch <i>B. alba</i>	11	6	Sun-scalds, half hardy.
Sweet Birch, <i>B. lenta</i>	13	7	Vigorous growth, hardy.
Canoe Birch, <i>B. papyrifera</i>	12	8	Hardy and ornamental.
American Alder, from Ontario.....	5	2	Half hardy.
European Alder.....	5	2	“ “ “
<i>Populus bereolensis</i> (Russian Poplar).....	16	10	Very vigorous, hardy and ornamental.
“ Carolina.....	15	8	Not so spreading in its habits, hardy.
“ <i>Wobstii</i> Riga	15	8	Very fast growth, hardy.
“ <i>certinensis</i>	11	9	Strong grower, half hardy.
“ <i>Sibirica</i>	12	5	Large dark leaves, slow growth.
“ <i>Petrovsky</i>	15	10	Seems identical with <i>bereolensis</i>
“ <i>Alba argentea</i>	7	6	Silver-leaved, half hardy.
“ <i>Bolleana</i>	5	3	“ tender.
“ <i>tremuloides</i> , native.....	10	4	Trembling poplar.
“ Balm of Gilead, native.....	9	7	Promising for shelter belt.
“ Cottonwood (Dakota).....	16	14	A good windbreak, rapid grower.
“ “ (Nebraska).....	4	3	Kills to roots each winter.
<i>Salix acutifolia</i> , Sharp-leaved willow.....	15	12	Very rapid grower, good snow collector.
“ <i>Voronesh</i>	14	10	Very pretty in winter.
“ Wisconsin, weeping willow			Very tender, no good here.

SUMMARY.

A shelter belt composed of a number of varieties is more interesting and instructive than if only one variety is used ; it is also well to introduce evergreens into such belts as far as is practicable.

The Russian Poplars—*Bereolensis*, *Wobstii* Riga and *Petrovsky*, and our Ash-leaved Maple are quick growers and make good nurses for slower growing and more tender trees.

For permanent trees the slow growing varieties, such as Green, Red and Black Ash and White Elm, should be interspersed with the others, in time the wood of these varieties will be found valuable.

The best and so far only perfectly hardy evergreen is the native White Spruce.

Other conifers that will succeed with some protection are Common Cedar, Larch and Scotch Pine.

HEDGES FOR WINDBREAKS.

Below will be found a list of hedges now growing on this farm; they are trimmed each year about harvest time to a uniform height and width, this has a tendency to thicken them.

Ash-leaved Maple.—Of this tree about 4,000 feet of double hedge is now being tested, for a comparison, these are planted at different distances apart. It is found that two rows of trees planted alternately 3 feet apart each way makes the most effective windbreak. In height they are now from 6 to 16 feet according to age.

Ash, Native Green.—Seven hundred and forty feet of this hedge was planted in 1891; it is a slow grower, but healthy.

Elm, Native White.—Three hundred and seventy feet planted in 1891, compact growth, good snow collector.

Spruce, Native White.—Two hundred and fifty feet planted in 1893; this is 4 feet high; handsome all the year round; quite healthy and decidedly the most promising wind break hedge.

Populus Bereolensis.—Three hundred and seventy feet planted in 1891, with one year old trees in double rows 4 x 4, it now stands 9 feet high, and is a compact and effective windbreak.

Cottonwood (Dakota).—Three hundred and seventy feet planted with cuttings in 1891, now about 5 feet high, is of more spreading habit than Bereolensis Poplar, and so far not nearly so effective as a windbreak.

Sharp-leaved Willow.—Three hundred and four feet planted in double rows 4 x 4, with one year old trees. This is the most exposed of all hedges, but has made fine growth, is quite dense, and is now 8 feet high.

Black Cherry, Native.—Two hundred feet planted in 1893, with young trees from the bush, this is a free bloomer and very pretty, but runs badly to suckers.

Caragana arborescens.—Two hundred feet planted in 1893 with one year old trees, now 3 feet high, hardy and ornamental.

Asiatic Maple, Acer ginnala.—For a low ornamental hedge, this is very promising.

AVENUES.

There were added 47 ash-leaved maple trees to the avenues last spring, these were planted east and west to connect the two avenues already planted north and south, the trees were selected so as to be uniform in size with those already growing. The summer being unusually dry they made very little growth, but all have apparently become established. The excessive drought of the past two seasons has had very little injurious effect on the avenues on this farm, only four of the 925 maple trees and none of the 180 native white spruce have died in the two years.

The 240 Russian poplars planted in the avenue on the east side of the farm are all making a rapid growth and will add variety to the avenue planting, 1,345 avenue trees are now growing on the farm, and the loss from all causes is only a fraction of one per cent per annum. This success is we believe due almost entirely to persistent, clean cultivation for six feet on each side of the trees: in fence corners where this was neglected the trees have soon died and had to be replaced.

Avenue trees are planted 20 feet apart, no water is used except for a week or two after planting should very dry weather occur.

PLANTING AROUND SUPERINTENDENT'S HOUSE.

Of the 27 varieties of trees and 49 varieties of ornamental shrubs planted around the superintendent's house in the spring of 1893 only the following varieties have winter killed :—

Mountain ash (*Pyrus Americana*), Scotch pine (*Pinus sylvestris*), Beech (*Fagus ferruginea*), Thunberg's barberry (*Berberis Thunbergii*).

Last spring the following varieties were added to the collection, and nearly all of them had become established before winter set in :—

TREES.

Siberian Cedar,
Choke cherry,
Basket Willow,
Pyrus Baccata,
Manitoba Basswood,
Cottonwood,
Russian *Euonymus*,
Native Thorn,

Riga Pine,
Native Red Willow,
Blue Spruce,
Black Ash,
Green Ash,
Red Ash,
Yellow Pine,
Dwarf Mountain Pine.

SHRUBS.

Native Sumac,
Lonicera Tatarica,
do *Alberti*,
do *Media*,
do *Splendens*,
Amur Tamarix,
Russian Privet,
Prunus Padus,
Bitter sweet, Native,
Rosemary Willow,
Pyrus Toringo,
Prunus Maackii,

Alnus incana,
Improved Elderberry,
White Tartarian Honeysuckle,
Rosa Rugosa, single,
do do double,
Artemisia Lancieolata,
Caragana grandiflora,
Lilac, Ambrose Verschaffeldt,
do *Flora plena*,
do Beranger,
Spirea Callosa Alba.

SUCCESS WITH TREE-CUTTINGS.

Below will be found a table giving the results of a comparative test between fall and spring cuttings of forest trees and shrubs.

The fall made cuttings were packed in sand until planting time in spring.

All were planted deep allowing only one bud out of the ground, all cuttings were eight inches long.

TREE-CUTTINGS.

Variety.	No. of cuttings planted.	When Cut.	Percentage Struck.	Remarks.
Populus Bereolensis.....	100	Fall.....	50 per cent.	Fair growth.
“ “.....	100	Spring.....	75 “	Large healthy growth.
“ Wobstii Riga.....	50	Fall.....	70 “	Fair growth.
“ “.....	50	Spring.....	80 “	Poor “
“ Sibirica.....	100	Fall.....	42 “	Large healthy growth.
“ “.....	100	Spring.....	42 “	“
Cottonwood (Dakota).....	100	Fall.....	70 “	Very large and healthy growth.
“ “.....	100	Spring.....	25 “	Small healthy growth.
Artemisia (Siberian).....	300	Fall.....	100 “	4 feet, healthy growth.
“ “.....	300	Spring.....	100 “	“
“ (Eng. Var).....	25	“.....	100 “	Small growth, very healthy.
“ “.....	25	Fall.....	100 “	“
Salix Voronesh.....	400	Spring.....	100 “	Fair growth.
“ “.....	400	Fall.....	100 “	“
“ Acutifolia.....	250	Spring.....	94 “	“
“ “.....	250	Fall.....	90 “	“

SUMMARY.

Russian Poplars (Bereolensis and Wobstii Riga) have succeeded best from spring cuttings.
Cottonwood has done best from fall cuttings.
Willows and Artemisia cuttings have nearly all grown equally well whether made in the fall or spring.

SEED GATHERED AND SOWN.

Last season it was found that many of the trees planted on the farm in former years were sufficiently large to bear seeds, a large quantity of this seed was gathered ; some of it was sent to the other Experimental farms, a portion sown here in seed beds in the fall, and the balance was packed in sand for sowing and distribution in the spring.

TREES.

The number of trees, shrubs, etc., growing on the farm at this date is as follows :—

Shelter belts.....	11,211
Avenues.....	1,345
Hedges.....	7,973
Two year old maples.....	8,461
One year old maples.....	2,000
Fruit trees and bushes.....	4,019
Nurseries and permanent plantations.....	30,715
Total.....	65,724

FOREST TREE AND SMALL FRUIT DISTRIBUTION.

Four hundred and sixty-eight packages of forest trees were sent out from this farm during the year, the trees supplied were of the same varieties as those sent out last year, a list of which will be found on page 267 of last year's report.
In addition to the above, one hundred and seventy-five packages of small fruits were also mailed to farmers throughout the province.
Circulars were sent to the parties receiving trees, asking for a report of their success or otherwise, these particulars will be compiled, and will, no doubt, prove a useful guide in future distributions.

Three hundred and fifty 1-pound packages of native Ash Leaf Maple seeds were distributed throughout the province, principally to farmers ; reports regarding these are coming in daily, and evidently this is one of the best means of encouraging tree growing, undertaken by the Experimental Farms.

VEGETABLES.

POTATOES.

The light rainfall of the past season greatly reduced the yield of potatoes, but the quality was excellent.

The land was summer-fallowed the previous season, no manure was applied.

The seed was ploughed in, rows 3 feet apart, sets 1 foot apart in the row. Breed's Weeder was run crosswise of the rows until plants were 3 inches high, after which they were cultivated with a one horse cultivator lengthwise.

We would call particular attention to the early maturing of the Early Ohio, which gave dry and good flavoured tubers on 4th August, nearly three weeks earlier than the Early Rose, this agrees with our experience in former years. The varieties were all planted on clay loam, and the yield in each case has been calculated from the product of one row, 66 feet long.

POTATOES—Test of varieties.

Name of Variety.	Planted.	Dug.	Fit for eating.	When Matured.	Quality.	Total Yield per Acre.		Yield per Acre of Sound.		Form and Colour.
						Bush.	Lbs.	Bush.	Lbs.	
Pearce's Prize Winner...	May 16.	Sept. 20	Sept. 10	Sept. 15	Wet	212	40	212	40	Pink.
Everett.....	" 16.	" 20	Aug. 23	Duggr'n	Good, dry	176		176		"
Holborn Abundance....	" 16.	" 20			Damp	172	20	172	20	"
Crown Jewel.....	" 16.	" 20	Aug. 23	Sept. 10	Good, dry	166	50	166	50	Pink and white
Algoma No. 1.....	" 16.	" 20	" 11	" 3	"	166	50	166	50	Pink.
Lee's Favorite.....	" 16.	" 20	" 10	Duggr'n	"	165		165		"
Chicago Market.....	" 16.	" 20	Sept. 10	Sept. 15	"	165		165		"
Early Rose.....	" 16.	" 20	Aug. 23	" 15	"	150	20	150	20	"
I. X. L.....	" 16.	" 20		Not ripe	Wet	148	30	148	30	Pink and white
Polaris.....	" 16.	" 20	Sept. 10	Sept. 15	"	146	40	146	40	White.
American Wonder.....	" 16.	" 20		Not ripe	Wet, poor	146	40	146	40	"
Thorburn.....	" 16.	" 20	Aug. 23	"	Good, dry	144	50	144	50	Pink and white
Daisy.....	" 16.	" 20	" 23	Sept. 15	"	143		143		" "
Early Ohio.....	" 16.	" 20	" 4	Aug. 25	"	143		143		Pink.
World's Fair.....	" 16.	" 20		Not ripe	Fair.....	139	20	139	20	White.
Northern Spy.....	" 16.	" 20	Aug. 10	"	Wet, poor	137	30	137	30	Bright pink.
Dakota Red.....	" 16.	" 20		"	Damp	135	40	135	40	Red.
White Beauty.....	" 16.	" 20	Aug. 23	Sept. 15	Good, dry	135	40	135	40	White.
Sharpe's Seedling.....	" 16.	" 20	" 23	" 15	"	132		132		Pink and white
Empire State.....	" 16.	" 20		Not ripe	Wet	128	20	128	20	White.
Late Puritan.....	" 16.	" 20	Sept. 3	"	Good, dry	124	40	124	40	"
Early Puritan.....	" 16.	" 20	Aug. 23	Sept. 15	Fair	124	40	124	40	"
Burpee's Extra Early..	" 16.	" 20	" 11	" 20	Good, dry	121		121		Pink and white
Clarke's No. 1.....	" 16.	" 20	Sept. 20	Not ripe	Fair	121		121		Pink.
Early Sunrise.....	" 16.	" 20	Aug. 10	Sept. 15	Good, dry	117	20	117	20	"
Harbinger.....	" 16.	" 20	Sept. 3	" 20	"	117	20	117	20	Pale pink.
State of Maine.....	" 16.	" 20		Not ripe	Wet	110		110		White.
Early Northern.....	" 16.	" 20	Aug. 11	Sept. 15	Good, dry	110		110		Pink.
Freeman.....	" 16.	" 20	Sept. 15	" 20	Wet	106	20	106	20	White.
Pride of the Market.....	" 16.	" 20		Not ripe	"	100	50	100	50	"
Pride of the Table.....	" 16.	" 20		"	"	99		99		Pink, bright p'k
Lizzies Pride.....	" 16.	" 20	Aug. 11	Sept. 20	Good, dry	99		99		[eye.
London.....	" 16.	" 20	" 23	Sept. 15	"	93	30	93	30	Pink.
Rural Blush.....	" 16.	" 20		Not ripe	Wet	78	50	78	50	"
Dreer's Standard.....	" 16.	" 20	Sept. 10	"	Good, dry	77		77		White.
Pearce's Extra Early....	" 16.	" 20	" 3	Sept. 15	"	75	10	75	10	Pink and white

VEGETABLE GARDEN.

The land used for this purpose was well manured in October, 1893, and then ploughed 7 inches deep, well harrowed and rolled, this was again harrowed and rolled in spring but not ploughed.

Owing to the exceptionally dry season, the vegetable garden was not as successful as usual.

TABLE CORN.

Seven kinds of garden corn were tested and did remarkably well, all ripening seed with one exception.

Native Squaw Corn.—Though the ears of this variety are small and of mixed colours yet on account of its earliness it is worth cultivating.

Mitchell's Extra Early.—An improvement by selection of the Squaw Corn, a white flint variety with ears of medium size and good flavour, it stood 8 degrees of frost in spring without injury, and can be sown quite early.

Extra Early Vermont.—A sweet corn of good flavour.

Cory.—A sweet corn white and of first-class flavour, this is undoubtedly the best corn for general purposes here.

Childs Honey Dew is rather late for this province.

Burpee's First of All.—A sweet variety of merit; flavour splendid and of good appearance; earlier than the Cory.

All were sown in hills 3 feet apart on 23rd May.

Variety.	Ready for use.	Quality.	Flavour.	Average weight per ear.	Average length per ear.	Average diameter.
Squaw Corn	Aug. 31 ..	Flint	Good	4 oz.....	4½ ins....	1¼ ins....
Mitchell's Extra Early	July 30 ...	"	Very good	7 "	8½ "	1½ "
Extra Early Vermont	Aug. 14 ...	Sweet	Good	6 "	6 "	1½ "
Cory	" 17 ...	"	Excellent	7 "	7½ "	1½ "
Dreer's First of All	" 13 ...	"	Very good	6 "	7 "	1½ "
Burpee's First Of All	" 12 ...	"	Good	7 "	7 "	1½ "
Child's Honey Dew	" 27 ...	"	Very good	7 "	8 "	1½ "

CAULIFLOWER.

This vegetable, like the cabbage, suffered much from dry weather, still some fair heads were obtained, which were white and tender.

Seven varieties were tested, sown in hot beds on 19th April, transplanted 23rd June.

Early Erfurt.—The earliest variety, heads of good texture and flavour, but the colour was poor.

Gilt Edge.—Not large, but of splendid texture and colour, medium early and very tender.

Early Snowball.—The best all round variety grown, medium early of snowy whiteness, fine grain and dense heads.

CAULIFLOWERS.

Name of Variety.	Fit for Use.	Percentage Headed.	Weight.		Description.
		Per cent.	Lbs.	Oz.	
Early Erfurt	Aug. 6 . . .	30	2	12	Fair shape, poor colour.
Giant White Pearl	" 31 . . .	25	2	8	Very poor shape.
Gilt Edge	" 31 . . .	75	2	12	Very good.
Early Favorite	" 6 . . .	65	2	4	Poor colour.
Large Early Dwarf Erfurt	" 25 . . .	70	2	0	Poor shape.
Early Snowball	" 25 . . .	85	2	12	Splendid.
Extra Early White	Sept. 4 . . .	40	2	12	Fair colour, small.

CABBAGE.

Nine varieties of cabbage were tested, but on account of the excessive dry weather it could scarcely be considered a fair test.

Mammoth Rock Red.—About 70 per cent of this variety headed out, good colour red to the centre, heads firm, a good red variety.

Marblehead Mammoth.—Fifty per cent of these headed, but were poor specimens.

Savoy.—This variety did fairly well, heads very curly and fine flavoured, but it has not good keeping qualities.

World Beater.—Not large, but all headed, and were firm and sound.

Burpee's All Head.—Sound, firm heads, similar to World Beater, both in earliness and appearance.

Louderbach.—Good solid heads, though small, heads flat and fine flavour.

All were sown in hot beds on 21st April, and transplanted to the garden 23rd June.

Name of Variety.	Date Pulled.	Description.	Percentage Headed.	Average Weight.
			Per cent.	Lbs.
Chester King	Sept. 21 . . .	Poor	5	3 $\frac{1}{8}$
Mammoth Rock Red.	" 21 . . .	Solid	70	4 $\frac{1}{4}$
Marble Head Mammoth	Oct. 1 . . .	Poor	50	2 $\frac{1}{2}$
Large Late Drum head	" 1 . . .	"	55	3
Savoy	Sept. 21 . . .	Fair	75	3 $\frac{1}{4}$
World Beater	" 21 . . .	Solid	100	5 $\frac{3}{8}$
Burpee's All Head	" 21 . . .	Flat and solid	100	4 $\frac{3}{4}$
Louderbach	" 21 . . .	Solid	90	5 $\frac{1}{4}$
Savoy Vertus	" 21 . . .	Fair	95	3 $\frac{1}{4}$

ONIONS.

This, we are convinced, is a vegetable that will pay well. All the varieties were sown on 20th April in the open ground in drills 1 foot apart.

Fancy Yellow Globe Danvers.—A splendid onion, similar to Yellow Globe Danvers, ripens early and thoroughly, attractive in appearance, a first-class onion for Manitoba.

Oregon Long Keeper.—A yellow Globe onion of good appearance, ripened well with us.

Large Red Weathersfield.—An old standard variety, a good keeper of fine flavour.

Yellow Globe Danvers.—This variety has been grown here for a number of years, is a first rate keeper, one of the best varieties for this country.

Prize Taker.—This was the largest onion grown this year, a little later than the other varieties.

King of the Earlies.—A flat red onion, superseded by Red Weathersfield, not so large and fine in appearance as that variety.

ONIONS.

Name of Variety.	When ripe.	Shape.	Colour.	Yield per Acre.
				Bush.
Prize Taker	Sept. 30....	Globe	Yellow.	629
Southport White Globe.....	" 10....	"	White.....	508
King of the Earlies.....	" 10....	Flat	Red.....	435
Large Red Globe.....	" 10....	Globe	"	411
Large Red Weathersfield.....	" 10....	Flat	"	411
Fancy Yellow Globe Danvers.....	" 10....	Globe	Yellow.	338
Yellow Globe Danvers.....	" 10....	"	"	338
World Beater, Weathersfield.....	" 10....	Flat.....	Red.....	338
Oregon Long Keeper.....	" 10....	Globe	Yellow.	326
Shallot sets.....	July 30....	"	"	9 lbs from 1 lb.

CELERY.

The seed being sown a little later this season than usual, and not having a large water supply, celery did not grow large, but all the varieties were of excellent quality and flavour; six varieties were tested, all sown in hot beds 13th April.

White Plume.—This was the earliest sort tested, some being ready for use 31st August, a self-blanching variety of splendid flavour, crisp and solid, but not as good a keeper as some of the other sorts.

Perle Le Grande.—A golden self-blanching variety of beautiful and attractive appearance, has a rich nutty flavour, peculiar to itself, a first-class sort.

Rennie's Giant White.—A celery of large size and quick growth.

Giant Golden Heart.—A beautiful variety, having a rich golden heart. Thick stalks of excellent flavour.

De Candolle.—A late variety, will apparently make a good keeper. All were blanched by the hilling system.

CELERY.

Name of Variety.	Date transplanted.	Length of head.	Flavour.	Weight per doz.
Perle Le Grande.....	June 25..	18 ins....	Splendid.	13 lbs.
White Plume.....	" 25..	12 " ...	Good	14½ "
Giant Golden Heart.....	" 25..	15 " ...	"	17½ "
Giant White.....	" 26..	18 " ...	Fair.....	13 "
De Candolle.....	" 26..	16 " ...	Good	13 "
Henderson's Golden Dwarf.....	" 26..	12 " ...	Fair.....	9 "

TOMATOES.

Seven varieties of tomatoes were tested. The seed was sown in hot bed on April 19th and transplanted to the open ground June 23rd, the latter operation being delayed on account of long continued dry weather. A noticeable feature of this test was the increased yield from home grown seed, the difference in productiveness was quite marked all through the season.

Name of Variety.	First ripe.	Proportion ripened.	Weight of one average tomato.	Shape.	Yield per 30 foot row.	
					lbs.	oz.
Earliest of all	Aug. 13..	$\frac{1}{3}$	3 ounces	Wrinkled, poor....	22	8
Earliest of all	" 8 ..	$\frac{1}{3}$	2 $\frac{1}{2}$ "	" "	6	4
Early Ruby	" 20..	$\frac{1}{3}$	3 "	Fairly smooth.....	5	5
Dwarf Champion	" 28..	$\frac{1}{4}$	3 $\frac{1}{2}$ "	Smooth, good shape	3	9
Livingston's Aristocrat	" 31..	None....	3 "	Fairly smooth.....	7	8
Ever-bearing	" 13..	$\frac{1}{3}$	1 "	Plum shaped.....	2	10
Atlantic Prize	Sept. 8..	$\frac{1}{3}$	3 $\frac{1}{2}$ "	Fairly smooth.....	5	9

From the foregoing tables it will be seen that the *Earliest of All* ranks first for earliness, closely followed by *Early Ruby*, and on account of the much better shape of the latter, it is preferable on early land.

Everbearing ripened next in order, it has egg-shaped fruit, with a very thick skin and poor flavour.

Dwarf Champion is of fine appearance, but somewhat late.

Atlantic Prize and *Livingston's Aristocrat* are good varieties, but too late for this climate.

Severe pruning when the fruit is well set is found to hasten ripening materially.

PEAS.

Sunol.—This was the earliest variety tested this year, and is well worthy of notice, small pods, a prolific bearer and of good flavour.

American Wonder.—This is the earliest of the wrinkled pease, dwarf and productive, a very desirable variety.

Horsford's Market Garden.—One of the best second early peas tested, very prolific, and bears its pods in pairs, flavour good.

Prince of Wales.—A good late pea, large pods and excellent flavour, very prolific, one of the best varieties tested.

Juno.—The best late pea tested, flavour excellent.

Blue Podded.—A novelty, which has nothing to recommend it.

All sown in drills 4 feet apart on 24th April.

PEASE.

Name of Variety.	Fit for use.	Height.	Size of Pod.	No. of Peas in Pod.	Flavor.	Yield.
Sunol.....	June 14	1 foot....	1 $\frac{3}{4}$ inches.	4 to 5	Good....	Fair.
American Wonder.....	" 18	6 inches..	2 "	5 to 6	"	"
Horsford's Market Garden	July 6	1 $\frac{1}{2}$ feet...	2 $\frac{1}{4}$ "	8	"	Very prolific.
Burpee's Profusion.....	" 7	14 inches..	2 "	7	"	"
Prince of Wales	" 8	2 $\frac{1}{2}$ feet...	3 "	8	Very good..	Fair.
Juno.....	" 8	14 inches..	2 "	7 to 8	Excellent...	Very prolific.
Blue Podded.....	" 10	18 "	2 $\frac{1}{4}$ "	6 to 7	Poor.....	Fair.
Yellow, for split purposes.....	" 30	18 "	2 "	5 to 6	Good.....	"

CARROTS.

Five varieties were sown but only four germinated, these did fairly well, being clean and free from rot.

Sown with drill in rows 14 inches apart, on May 1.

Name of Variety.	Shape.	Yield per Acre.	Remarks.
		Bush.	
Half Long Scarlet Nantes...	Stump rooted half long.	659	Excellent flavour, fine shoulder, one of the best.
Early Scarlet Horn.....	" " ..	470	Good flavour and appearance.
Improved Danvers Half Long	" " ..	452	Good shape and flavour.
French Forcing.....	" round..	367	Excellent flavour, a good early carrot.

BEETS.

Black Queen.—A fine new variety which can be highly recommended, flesh dark colour, leaves nicely curled, very attractive, the best variety tested.

Victoria.—A very good variety, long and of a fairly even red flesh and good flavour. The yield is based on the return from one row half a chain long.

All were sown 12th May in drills 18 inches apart.

BEETS.

Name of Variety.	Shape.	Colour.	Average weight per root.		Yield per acre.
			Lbs.	Oz.	Bush.
Rennie's Intermediate	Long.....	Very good, dark, no white...	5	4	677
Columbus.....	Turnip.....	Only fair, contains white....	2	8	516
Improved Arlington.....	Round.....	Very poor, too white.....	1	12	516
Crosby's Improved Egyptian.....	"	"	1	4	516
Dark Red Blood Egyptian.....	"	Fair, a little white.....	5	0	500
Victoria.....	.....	Very fair.....	1	15	484
Edmand's Early.....	Turnip.....	Very poor, too much white..	2	0	368
Black Queen.....	Pear shaped.	Very dark.....	1	0	337
Lentz Extra Early.....	Turnip.....	Very dark.....		12	322

BEANS.

Five varieties of beans were tested, and did very well, all ripening their seed. Sown in rows 2 feet apart on 23rd April.

Challenge Dwarf Black Wax was the earliest of the varieties tested, a bean of good colour and fairly productive, a good early variety.

Emperor William.—A white wax bean of excellent flavour and extremely vigorous and productive, pod rather crooked. This was the largest yielder of the varieties tested.

Thorburn's Early Refugee Wax.—A very productive yellow bean of good flavour, altogether a very desirable variety.

New Stringless Green Pod.—A green bean of good flavour, but with us not nearly so productive as the other varieties tested.

Broad Windsor Bean.—A broad bean of good flavour, dwarf, very prolific and should be more generally grown.

The following table gives particulars of this test :—

Name of Variety.	Dates sown.	Ready for use.	Size of pod.	Beans per pod.	Colour.	Flavour.	Yield.
			Ins.				
Challenge Dwarf, Black Wax.....	April 23	July 14	4 to 5	5 to 6	Yellow ..	Fair..	Fair.
New Stringless, Green Pod.....	" 23	" 15.	5	5 to 6	Green....	" Good.	"
Emperor William.....	" 23	" 17.	6	7	"	Excellent.	"
The Extra Early Refugee Wax	" 23	" 17.	5	6	Yellow ..	Good.....	Heavy.
Johnston's Wonderful Broad Bean..	May 18	" 18.	4	4 to 5	.....	Very good	Fair.

RADISH.

Six varieties of radish were tested, all were sown in the open, in drills 12 inches apart, on 1st May.

Rosy Gem, the best early variety, is a small radish of excellent quality, mild and crisp, and retains its qualities a long time.

Brightest Long Scarlet, of medium length, stump rooted and of a brilliant scarlet colour, mild and crisp, a fine market radish on account of its colour.

Pearl Forcing, has a rich waxy white appearance, texture firm and solid, grows to an immense size, on 15th July specimens were a foot long and of excellent quality, this is a good late variety.

Charter's Improved, and *White Tipped Turnip*, were adversely affected by the dry weather, and were tough, hot and stringy.

Name of Variety.	Date sown.	Ready for use.	Shape.	Colour.	Flavour.
Rosy Gem.....	May 1..	May 31.	Turnip.....	Rose	Excellent.
Brightest Long Scarlet.....	" 1..	June 1.	Long.....	Scarlet.....	"
Early Scarlet	" 1..	" 4.	Olive shaped	"	Good.
Charter's Improved.....	" 1..	" 6.	Long.	"	Poor.
Pearl Forcing.....	" 1..	July 15.	"	White.....	Fair.
White Tipped Turnip.....	" 1..	June 7.	Turnip... ..	S.W. Tip'd.	Poor.

LETTUCE.

Eight varieties of lettuce were sown, one of which did not germinate, viz., *Sensation*. The other varieties did fairly well.

California Cream Butter.—A cabbage variety of fair quality, very much curled, and little heart.

Trianon.—A fine Cos lettuce, when tied, makes a splendid heart, cool, crisp and mellow, apparently synonymous with Paris W. Cos.

California All Heart.—One of the best of the cabbage lettuces tested, beautifully curled and correctly named "All Heart."

New Iceberg.—One of the most beautiful of the cabbage lettuces, nicely curled and the edges of the leaves tinted with a reddish colour, cool and crisp, will prove a standard variety.

With one exception all were sown on 24th April in drills 8 inches apart in the open. New Iceberg was sown three weeks later.

Name of Variety.	Shape.	Flavour.	Weight.	Time Seeded.
			Lbs.	
California Cream Butter.....	Cabbage....	Fair.....	1½	June 28.
Trianon.....	"Cos".....	Very good..	2¾	July 10.
California All Heart.....	Cabbage....	".....	2	" 14.
Golden Queen.....	".....	Good.....	1	" 5.
New Iceberg.....	".....	".....	1	" 25.
Toronto Gem.....	".....	Fair.....	¾	" 5.
Paris White Cos.....	"Cos".....	Very good..	2¾	" 10.

CUCUMBERS.

Five varieties were tested both in frames and outside, those sown in frames were certainly the best, a spent hot-bed seems to suit them remarkably well, all sown 21st May.

White Spine.—Fruit 7 to 10 inches long of a dark green colour, the best spine cucumber tried, early.

Cool and Crisp.—Skin very dark green, of very attractive appearance, early.

Siberian.—The earliest variety tested, small, very productive, produces cucumbers in about 60 days from sowing.

Giant Pera.—The largest and longest cucumber tested, of splendid shape, a good late variety.

Crosse and Blackwell's Pickling.—A small fruited variety, 3 or 4 inches long, fine for pickling.

CUCUMBERS.

Name of Variety.	When ready for use.		Shape.	Flavour.	Productiveness.
	Sown in hot beds.	Sown outside.			
White Spine.....	July 1....	Aug. 15..	Medium size, rough.	Good.....	Very prolific.
Cool and Crisp.....	" 5....	" 18..	".....	Fair.....	Medium.
Siberian.....	" 5....	" 16..	Medium size.....	".....	Fairly prolific.
Giant Pera.....	" 31....	" 25..	Long and smooth..	Excellent...	Very prolific.
Crosse and Blackwells Pickling.....	" 20....	" 12..	".....	Fair.....	Fairly prolific.

RHUBARB.

Owing to the scarcity of fruit in Manitoba, large quantities of rhubarb are consumed. For this reason considerable attention has been paid to this useful plant, and a collection of 22 varieties have been under test.

These plants have received very little attention, except to keep them clean from weeds during the growing season and manure well each fall.

From the accompanying table it will be seen that the yields under the same conditions vary greatly.

Tottle's Improved, a variety which originated in this province, still takes the lead, it is a large, tender, productive variety, very vigorous and seldom goes to seed.

Variety.	When planted.	Fit for use.	Colour.	Quality.	Yield per plant.	
					lbs.	oz.
Tottle's Improved.....	1892...	May 20	Light red..	Tender....	35	5
Johnston's St. Martin (seedling of).....	"	" 24	Red.	"	15	7
Early Crimson.....	1893...	" 27	Light red..	"	13	14
Prince Albert.....	"	" 30	"	"	13	14
Victoria Seedling	1892...	" 24	Red.	"	13	6
Early Prince.....	1893...	" 29	Dark red..	Very tender	12	11
Strawberry.....	"	" 26	Light red..	Fair.	11	12
Brabant's Colossal	"	" 28	Green.	Tender....	10	14
Giant.....	"	" 27	"	Very tender	10	11
Royal Albert	"	" 30	Light red..	Fair.....	10	10
Scarlet Nonpareil.....	"	" 31	Light green	Tender....	9	14
Myatt's Linnaeus (seedling of).....	1892...	" 24	Spotted....	"	9	10
Magnum Bonum.....	1893...	" 29	Light red..	"	9	
Tobolsk	"	" 30	"	Very tender	8	13
Scott's Mammoth (seedling of).....	1892...	" 24	Green.....	Poor.....	7	11
Marshall's Royal Linnaeus.....	1893...	" 29	Spotted....	Tender....	7	
Sangster's Prince of Wales.....	"	" 29	Dark red..	Ex. tender..	6	7
Paragon.....	"	" 30	Green.	Fair.	6	4
Early Scarlet.....	"	" 29	Dark red..	Very tender	4	4
Golden Syrup	"	" 30	"	"	3	8
Salt's Perfection.....	"	July 2	Light red..	Tender....	3	4
General Taylor.....	"	" 2	Green.....	Hard.....	1	12

FLOWERS.

Owing to the very dry season, the flower garden on the farm was not as good as usual, still it was surprising how well some of the varieties bloomed, even in the hottest weather.

ANNUALS.

Name of Variety.	Date sown.	How sown.	Planted out.	Flowering period.	Remarks.
Acrocinium album.....	April 17	Boxes, hot bed	June 20	June 19 to Sept. 16	A good everlasting.
Adonis æstivalis.....	" 16	" "	" 21	Sept 1 to " 16	Rather late for us.
Alyssum Tom Thumb.....	May 22	Outs'de .....	.....	July 10 to " 16	Nice for edgings.
Antirrhinum majus nanum.	April 17	Boxes, hot bed	June 20	" 7 to " 16	Very fine.
Asters, Truffauts perfection	" 13	" "	" 15	Aug. 4 to frost....	One of the finest annuals.
" Peony Flowered. ...					
" Victoria					
Balsams, mixed	" 17	" "	" 20	July 20 to Sept. 16	An old standard.
Browallia, mixed.....	" 16	" "	" 27	June 27 to " 16	A pretty dwarf annual.
Calandrinia, mixed.	" 17	" "	" 20	July 1 to frost	Did fairly well.
Cheiranthus maritima.....	" 21	" "	" 11	June 3 to Aug. 1..	Should be sown outside.
Clarkia, mixed	" 16	" "	" 20	" 20 to " 20	Did not do well.
Cerinthe auriculata.....	" 16	" "	" 13	" 19 to Sept. 14	Not of much value.
Calliopsis, mixed	Selfs'wn	Outside.....	.....	" 28 to " 16	Very useful and showy.
Chrysanthemum	April 16	Boxes, hot bed	June 20	" 15 to " 16	A useful annual.
Convolvulus minor.....	" 19	Outside.....	.....	" 30 to " 16	"
Carthamus tinctoria	" 16	Boxes, hot bed	June 23	July 10 to July 16	An insignificant variety.
Centaurea cyanus.....	" 16	" "	" 20	" 1 to Sept. 15	Very free flowering.
Centrosema grandiflora.....	" 17	" "	" 21	Aug. 11 to " 10	Pretty climber.
Datura, sweet nightingale..	" 20	" "	" 23	" 7 to " 16	Fine for centres.
Eschscholtzia Californica...	May 22	Outside .....	.....	July 10 to " 10	A showy annual.
Gaillardia Lorenziana.	April 14	Boxes, hot bed	June 20	" 7 to " 16	A grand annual.
Godetia, mixed.....	" 17	" "	" 20	" 12 to " 5	Did not do well.
Gilia tricolor.....	" 14	" "	" 20	Aug. 1 to " 16	Not of much value.
Helichrysum monstrosum..	" 16	" "	" 20	July 28 to " 16	A fine everlasting.
Linaria reticulata.....	Selfs'wn	Outside.....	.....	June 1 to frost....	Very free flowering.
Larkspur, mixed.....	" "	" "	.....	" 12 to July 28	Did not do well.
Zinnias	April 16	Boxes, hot bed	June 12	July 14 to Sept. 16	A showy annual.
Linum roseum.....	May 22	Outside .....	.....	" 1 to " 10	Very showy.
Marigold, dwarf French...	April 16	Boxes, hot bed	June 15	June 15 to " 16	A showy annual.
" El Dorado.....	" 16	" "	" 12	July 15 to " 16	Not of much value.
Mignonette, 8 varieties....	May 30	Outside.....	.....	" 14 to " 16	Fine for perfume.
Marablis jalapa.....	April 17	Boxes, hot bed	June 18	" 25 to " 16	A fine annual.
Nasturtiums, mixed.	May 22	Outside.....	.....	Aug. 1 to " 16	An old favourite.
Phlox Drummondii.....	April 13	Boxes, hot bed	June 11	June 15 to frost....	A brilliant annual.
Poppies, several varieties..	May 22	Outside.....	.....	July 28 to Sept. 5	A very showy annual.
Phlox (Double Yellow)....	April 18	Boxes, hot bed	June 23	June 30 to " 16	Not up to reputation.
Pyrethrum aureum.....	" 16	" "	" 23	Foliage plant.....	Fine for edgings.
Portulaca, mixed.....	Selfs'wn	Outside.....	.....	July 15 to frost....	An old favourite.
Ricinus, Queen of "Cambodia"	April 20	Pots, hot bed..	June 20	Foliage plants ..	Fine for centres.
Sweet Peas.....	" 18	Outside .....	.....	June 27 to Sept. 5	A most useful annual.
Stocks, mixed.....	" 19	Boxes, hot bed	June 14	July 7 to " 16	An old favourite.
Scabiosa, mixed	" 14	" "	" 23	" 15 to " 16	A very pretty annual.
Sunflower (new miniature).	" 20	" "	" 23	" 20 to " 10	A pretty dwarf sunflower.
" Tall	" 16	" "	" 23	" 20 to " 15	Very effective background
" Texas Silver Queen	" 19	" "	" 23	Aug. 20 to " 16	A novelty in sunflowers.
Sapiglossis, Finest mixed..	" 14	" "	" 23	July 30 to frost....	A splendid showy annual.
Schizanthus, mixed.....	" 17	" "	" 23	June 20 to Sept. 5	A very pretty annual.
Viscaria, mixed.....	" 16	" "	" 20	" 26 to " 30	Not very desirable.
Verbena	" 13	" "	" 18	July 28 to " 16	Did not do well.

Thirty-five varieties of perennials were growing on this farm last spring, many of them very attractive and fine bloomers.

As the principal object in growing perennials here is to ascertain which are hardy in this climate, mention will be specially made of those found by experience to be hardy in our severe winters.

All have been protected on approach of winter by covering with strawy manure or corn stalks, this has been removed gradually in early spring.

PERENNIALS.

Variety.	When planted.	Date of flowering.	Remarks.
Columbine (double purple).....	May 3, 1894	June 30 to July 10	A grand flower.
“ Chrysantha.....	“ 11, “	July 23 to Sept. 1	A handsome, long, spurred variety.
Delphinium grandiflorum.....	“ 10, “	July 7 to frost....	One of the best.
Dianthus barbatus.....	Sown 1893..	June 17 to frost...	One of the most brilliant.
Hemerocallis flava.....	Fall, 1893...	July 24 to Aug. 30	Splendid for masses.
Hyacinths, mixed.....	“ 1893...	May 25 to June 12	Flowered freely in spring, must be well protected in winter.
Gladiolus, mixed.....	Started in frame May 5, planted out June 11, '94.	Aug. 7 to frost....	Did very well, but too dry to make large bulbs; requires so be taken up in fall.
Iris, 7 varieties.....	Fall, 1893...	June 9 to 29.....	One of the best early perennials.
Lilium umbellatum.....		June 29 to July 10	Very hardy and showy.
“ auratum.....	Fall, 1893...	July 23 to July 26	A most brilliant lily.
Linum perenne blue.....	May 7, 1894.	July 25 to Sept. 5	Very pretty, but should not be allowed to spread.
Narcissus, mixed.....	Fall, 1893...	May 26 to June 10	Proved quite hardy here.
Platyco don grandiflorum.....	“ ...	Aug. 5 to Sept. 10	A showy perennial, one of the best.
“ “ album..	“ ...	Aug. 7 to Sept. 10	“ “ “ “ “ “
Pansies, mixed.....	1893.....	May 1 to frost....	An old favourite, and hardy here.
Scilla sibirica.....	Fall, 1893...	May 1 to May 16..	A pretty spring flower, very hardy.
Tulips, mixed.....	“ ...	May 15 to June 18	Show well here, and are among the first to bloom in spring.

ROSES.

The roses received in previous years were planted in exposed positions, and we have had very little success with them generally, the Rosa Rugosa family being the only exception, these have proved quite hardy and have flowered freely, the blooms are mostly single, but their foliage and fruit is very attractive.

The following varieties were added to the stock this year:—

Perpetual Moss,
Henri Martin,
Marie Rady,
Gem of the Prairie,
American Beauty,
Madame Bruant,

Perpetual White,
M. Cranston,
Dinsmore,
M. P. Wilder,
Seven Sisters.

These were planted in one of the sheltered plots; Madame Bruant and American Beauty gave some fine bloom. The plants were all protected on approach of winter by placing frames around the plants and banking well with manure.

SEED GRAIN DISTRIBUTION.

It is found that farmers here are so hurried at the harvest seasons that very few of them will expend the labour necessary to keep a 3-pound sample of a new variety of grain separate from the varieties already on their farm, for that reason more attention has been given here to the sale of two bushel lots, the amounts harvested from parcels of this size are sufficiently large to thresh with a separator, and are more likely to be kept distinct.

Only varieties which from several years' test have proven to be superior to those generally grown, are distributed.

As the stock of such seed grain was small last year, a great many applications could not be filled, this year the supply is larger, and already many applications have been received.

The following are the number of parcels and kinds of grain distributed during the past year :—

3 lb. samples, wheat.....	25
2 bushels and over, wheat.....	16
3 lb. samples, oats.....	43
2 bushels and over, do.....	11
3 lb samples, barley.....	18
2 bushels and over, barley	95
Potatoes	71
Total number of applicants supplied.....	279

Circulars were sent to each person supplied with two bushels or over. About one-third of those supplied with Odessa Barley have already sent in reports, the following table is a summary of these :—

SUMMARY OF REPORTS ON ODESSA BARLEY.

No. reports received.	No. reports rust.	No. reports smut.	Injured by spring frost.	Injured by fall frost.	Stiff straw.	Medium stiff straw.	Weak.	Average days maturing.	Average yield per acre.	Range of yield.
31	2	3 "a little," 2 "yes."	5	None.	18	8	4	85	bus. lbs. 30 15	10 to 55 bus.

Reports from farmers supplied with wheat and oats are not at hand at this date in sufficient numbers to compile.

TILE DRAINING.

In my last annual report I mentioned that 3,400 feet of tile drain had been laid on the farm in 1893. I am pleased to be able to report that this drain worked satisfactorily all the season, and enabled us to reap a heavy crop of oats on two fields which we had been unable to sow during past years on account of deep ponds.

This fall 1,730 feet of additional tile has been laid, completing the draining on that portion of the farm.

The smaller branches have 3-inch tiles, the mains from 4 to 6 inches. The depth varies from 3 feet to 8 feet, the amount of fall is about 10 feet in the 4,300 feet of main drain.

FARMERS' INSTITUTE MEETINGS.

Institute meetings were attended at the following places by invitation, and the papers mentioned read by me :—

- December 8th, 1893.—Bradwardine, "Review of past season," full house.
- do 19th, 1893.—Melita, "Cattle feeding," large attendance.
- do 20th, 1893.—Minga, "Grain growing," small attendance.
- do 21st, 1893.—Killarney, "Results of 1893 experiments," fair attendance.
- do 22nd, 1893.—Crystal City, "Results of 1893 experiments," fair attendance.

- December 23rd, 1893.—Boissevain, "Fodder plants and dairying," fair attendance.
 January 3rd, 1894.—Portage la Prairie, "A review," fair attendance.
 do 17th, 1894.—Manitoba Dairy Association, Winnipeg, "Wintering dairy cows."
 do 18th.—Kildonan, "Suggestions to suburban farmers."
 February 10th.—Brandon, "What have we learned about mixed farming during the past year."
 do 15th.—Blythe, same subject, good attendance.
 March 3rd.—Blythe "Feeding cattle," good attendance.
 do 8th.—Boissevain, "Grain experiments," full house.
 do 9th.—Manitou, "Grain experiments," good attendance.
 do 10th.—Morden, "Mixed farming," good attendance.
 do 12th.—Kildonan, "Trees, fruits and flowers," good attendance.
 do 13th.—Rosser, "Farm experiments," small attendance.
 do 14th.—Neepawa do do
 do 26th.—Belmont, "Varieties of grain," full house.
 June 2nd.—Elkhorn, "How to farm with profit under present circumstances."
 do 15th.—Oak Lake, "A review."
 do 27th.—Oak Point, "Care of stock and small fruit cultivation."

ACKNOWLEDGMENTS.

I beg to acknowledge the following donations to this farm during the year :—

Joseph Anderson, Napinka, Man., half bushel Wright's favourite wheat.
 A. B. Jones, Hartford, South Dakota, Success, Champion and Excelsior Barleys.
 Wm. Wagner, Ossowa, Man., French Tares.
 G. A. Davenport, Russell, Man., Monarch wheat.
 Frank Cutten, Birds Hill, Man., selected wild raspberry.
 A. P. Stevenson, Nelson, Man., Collection plants.
 James Bell, Ninette, Man. do
 Rev. W. W. Colpitts, tree seed.
 Nelson Bedford, plant seed.
 A. J. Butcher, Rapid City, wild clover seed.
 T. M. Boddy, Portage la Prairie, seed potatoes.
 J. Barton, Brandon, seeds.
 J. Daniel, Moosomin, N.W.T., vegetable seed.
 Prof. Bailey, Cornell University, plants.
 D. D. Buchanan, plants.

METEOROLOGICAL.

Below will be found the maximum and minimum thermometer readings for the past eleven months, also, the amount of rainfall and sunshine for the growing season :

	<i>Rainfall.</i>	Inches.
April.....		.7
May .....		.7
June		1.7
July .....		.8
August.....		.7
September .....		.5
		<hr/> 5.1

Sunshine.

	Hours.
March	137·2
April	148·0
May	257·3
June	283·7
July	306·1
August	264·0
September	166·2
	<hr/> 1562·5

TEMPERATURE.

Months.	Maximum.	Minimum.
	°	°
January	38·5 on 13th....	46·8 on 24th.
February	39·6 on 28th....	33·6 on 19th.
March	41·5 on 2nd....	31·3 on 6th.
April	69·4 on 26th....	5·4 on 1st.
May	81·5 on 31st....	23·5 on 27th.
June	97·6 on 12th....	28·6 on 5th.
July	99·5 on 16th....	36·4 on 6th.
August	97·5 on 21st....	35·4 on 3rd.
September	88·9 on 5th....	16·0 on 30th.
October	70·0 on 15th....	14·0 on 29th.
November	49·6 on 6th....	25·2 on 28th.

CORRESPONDENCE.

Since my last report 2,113 letters have been received and 2,233 letters despatched from this office : this is irrespective of about 1,000 circulars sent out.

I have the honour to remain, sir,
Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF A. MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.,
31st October, 1894.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my seventh annual report, giving particulars of the work accomplished on the North-west Experimental Farm during the year 1894.

The crops on the Experimental Farm the past season have been the poorest since the farm has been established. Although the spring opened favourably and the seeding time was the best for several years past, dry weather set in early in the growing season and with a high temperature, often between 95° and 100°; the harvest resulted in small yields and with many varieties of grain in poor samples.

The crops throughout the Territories were variable. In the northern and north-western districts where rain was more abundant, gratifying results took place. In the eastern part of Assiniboia a fair crop of good wheat has been reaped, while the western half suffered almost a total loss of grain and vegetables. Local showers gave fair crops to a few in a district, while others a few miles away had little or nothing from the showers passing them by. In many cases a good shower saved the crops, and although no large yields are reported, the quality of wheat was good wherever harvested. The harvest came in early and was easily taken off on account of the light crop of straw.

In no year has the beneficial effect of fallowing land been so apparent on the Experimental Farm as during the past season. While grain sown on fall and spring ploughing held out for a time and at first promised well for a good crop, it gradually went back and finally was not worth cutting. Fallow-land on the other hand held out and proved, as it always has done, to be the only safe way of growing grain in this country. In the districts where almost total failure of crops took place, "fallows," it was said, were of no avail in averting the loss. This may have resulted from various causes, but may safely be put down to the fallow not having been worked early enough in the spring to receive the full benefit of the June and July rains of 1893. Many farmers leave their fallows till the proper season is past for the first ploughing, and then make one ploughing do for the season, resulting, in dry years, in certain failure.

Winds were not so destructive to crops on the Experimental Farm as in some former years. They were, however, troublesome and injured a good many plots after the grain was well above ground, the tender blades being cut by the small particles of earth being blown through them. Winds were continuous during a large part of the growing season, and after being very warm caused the ground to dry up much more than it otherwise would have done.

Weeds caused great loss throughout the country the past season, the dry weather giving them a good start in land not properly worked. Pig weed (*Chenopodium album*)

was the most common and did the greatest harm. The Experimental Farm was not exempt from this enemy of the North-west farmer, one field of Red Fife wheat being injured very much, although it had been fallowed the previous year.

As already stated, the crops on the Experimental Farm were poor the past season. This includes grain, roots and part of the vegetables.

In wheats the largest yield did not exceed twenty bushels per acre; while some were as low as twelve bushels. The tests made with fallow against stubble land demonstrated without a doubt the advisability of depending chiefly on the first-mentioned method of preparing land for grain crops. While it may do to risk a portion of the crop on stubble spring-ploughed, it is folly for anyone to depend entirely on it.

Barley was a poor crop, by far the worst ever cut on the farm. The seed came up evenly and the plants made good growth till 8 or 10 inches in height, when dry weather set in, and from then until ripe very little gain was made. The 2-rowed sorts especially were very short in straw and gave small yields.

The oat crop on fallow land was fair, while on either fall or spring work it was hardly worth cutting. One field of five acres on spring ploughing was ploughed up early in the season, so that the piece of land might be fallowed.

Pease were a light crop, but the sample was very good.

Field roots, like the grain, suffered from the dry, hot weather, and as will be seen in the result of tests, gave small yields.

Fodder crops, including corn, mixed grain, &c., were very light, but of good quality. The corn was further advanced at time of cutting than in any previous year, and will, no doubt, make better ensilage than it has generally done.

Trees did not make anything like the growth of the preceding year. Considerable growth, however, was made early in the season, and the long fall without severe frosts has allowed the wood to ripen, and it is expected that all will go through the coming winter in good condition.

Small fruit bushes gave promise early in the season of a most abundant crop of berries, but the dry weather completely dried up raspberries and strawberries, and while currants were numerous, the quality of the fruit was poor and the size small.

The past season has been favourable for stock. Although grass or fodder was short on the prairies from want of rain, absence of flies and mosquitoes enabled the cattle to do much better both in flesh and milk than in the preceding year. I regret having to report the presence of tuberculosis in the herds on Experimental Farm and the killing of 13 animals out of 39 tested. Among the 13 were many of the finest in the herd, including Durhams, Polled Angus, Holstein and Grades. The tests and results will, no doubt, be given more fully elsewhere in this report, and having been carried out under your own supervision, will require no lengthy explanation here.

I am pleased to note the increased interest taken in dairy work throughout the country, as well as the large numbers going into mixed farming. Only in a few districts is wheat still "king," while many are adding cattle, pigs, poultry, &c., to the farm work.

WHEAT.

Twenty-eight varieties of wheat were tested the past year, including 12 cross-bred sorts. None of these have produced heavy straw or given a large yield of grain, and the sample of many kinds was thin and light.

Following are the results of the tests in full:—

Test of different varieties, sown same date, $\frac{1}{10}$ acre each.

Twenty-six varieties were sown on same day on fallow land, a sandy clay loam, by drill, with the following result :—

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.			Weight per Bushel.	Proportion Rusted.
			Inch's		Inch's		Lbs	Bush.	Lbs.	Lbs.		
Campbell's White Chaff.	Aug. 8.	109	28	Stiff.	2 $\frac{3}{4}$	Beardless.....	102	21		62	No r st.	
White Fife.....	" 10.	111	28	"	3	"	118	20	20	63	"	
Dion's.....	" 8.	109	31	Weak	2 $\frac{1}{2}$	Bearded.....	110	20		63 $\frac{1}{4}$	"	
Major.....	" 10.	111	28	"	2 $\frac{3}{4}$	"	124	19	20	61 $\frac{1}{4}$	"	
Wellman's Fife.....	" 11.	112	28	Stiff.	3	Beardless.....	120	19	10	62	"	
Red Fern.....	" 10.	111	31	Weak	2 $\frac{3}{4}$	Bearded.....	120	19	10	63 $\frac{1}{4}$	"	
Herisson, Bearded.....	" 8.	109	28	"	2	"	107	19	10	66 $\frac{3}{4}$	"	
Percy.....	" 10.	111	28	Stiff.	2 $\frac{3}{4}$	Beardless.....	112	19	10	62 $\frac{1}{4}$	"	
White Connell.....	" 10.	111	27	"	2 $\frac{3}{4}$	"	115	19		63	"	
Rio Grande.....	" 10.	111	29	Weak	3	Bearded.....	106	18	40	62 $\frac{1}{4}$	"	
White Russian.....	" 9.	110	27	Stiff.	3	Beardless.....	105	18	20	63 $\frac{1}{4}$	"	
Preston.....	" 8.	109	27	Weak	2 $\frac{3}{4}$	Bearded.....	110	18	20	63	"	
Pringle's Champlain....	" 8.	109	27	"	3	"	105	18	20	63 $\frac{1}{4}$	"	
Red Fife.....	" 10.	111	29	Stiff.	2 $\frac{3}{4}$	Beardless.....	107	18		62	"	
Huron.....	" 10.	111	27	Weak	3	Bearded.....	125	17	30	62 $\frac{3}{4}$	"	
Mars.....	" 10.	111	27	Stiff.	2 $\frac{3}{4}$	Beardless.....	105	17		63 $\frac{1}{4}$	"	
Crown.....	" 8.	109	28	Weak	2 $\frac{3}{4}$	Bearded....	123	17		62 $\frac{1}{2}$	"	
Advance.....	" 8.	109	30	"	2 $\frac{1}{4}$	"	127	16	40	62 $\frac{1}{4}$	"	
Alpha.....	" 10.	111	26	Stiff.	3	Beardless.....	125	16	40	62 $\frac{1}{4}$	"	
Stanley.....	" 8.	109	27	"	3	"	127	15	30	60 $\frac{3}{4}$	"	
Ladoga.....	" 4.	105	28	Weak	3	Bearded.....	119	15	30	60 $\frac{3}{4}$	"	
Ottawa.....	" 6.	107	27	"	3	"	137	15	30	61 $\frac{1}{4}$	"	
Blenheim.....	" 10.	111	28	Stiff.	2 $\frac{3}{4}$	"	116	15	15	62	"	
Captor.....	" 8.	109	27	"	2 $\frac{3}{4}$	"	110	15		61 $\frac{3}{4}$	"	
C. No. 1.....	" 8.	109	30	Weak	2 $\frac{1}{2}$	"	110	13	20	61 $\frac{1}{4}$	"	
Gehun.....	" 2.	103	22	Stiff.	2 $\frac{1}{4}$	Beardless.....	70	12	30	65 $\frac{3}{4}$	"	

TEST OF SOWING PLOTS A WEEK APART.

Two varieties of wheat, Red Fife and Stanley, were sown on same day of the week for 6 consecutive weeks, on clay loam, size of plots $\frac{1}{10}$ acre.

The first sown plot of Red Fife was never promising and produced a small yield. In none of the other plots was there much difference noted in the growing season and the yields varied very slightly.

In this test in 1892 and 1893, the earliest sown grain gave slightly the smaller yield.

To this year's result of tests is added date of seeding and yield of same test in 1892 and 1893, for comparison and the average for 3 years is struck. This average shows that very early or very late sowing is not advisable, but that from about April 20th, to the 15th May wheat may be sown with the best results as far as yield is concerned.

SPRING WHEAT—RESULTS OF EARLY, MEDIUM AND LATE SOWING.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per acre.		Weight per Bushel.	Proportion Rusted.
				Ins.		Ins.		Lbs.	Bus.	Lbs.	Lbs.	
Red Fife.....	April 20	July 30	101	28	Stiff..	21 ¹ / ₂	Bald..	125	9	10	63	No rust.
".....	" 27	Aug. 6	101	28	" ..	21 ¹ / ₂	" ..	115	14	10	61 ¹ / ₂	"
".....	May 4	" 8	96	27	" ..	22 ¹ / ₂	" ..	107	16	20	61 ¹ / ₂	"
".....	" 11	" 10	91	26	" ..	22 ¹ / ₂	" ..	116	17		62	"
".....	" 18	" 11	85	26	" ..	22 ¹ / ₂	" ..	120	15	20	61 ¹ / ₂	"
".....	" 25	" 19	86	24	" ..	22 ¹ / ₂	" ..	113	17	50	60	"
Stanley.....	April 20	" 6	108	29	" ..	22 ¹ / ₂	" ..	115	15	50	60 ¹ / ₂	"
".....	" 27	" 8	103	29	" ..	3	" ..	110	16	40	61 ¹ / ₂	"
".....	May 4	" 8	96	28	" ..	23 ¹ / ₄	" ..	105	15	15	60 ¹ / ₂	"
".....	" 11	" 10	91	27	" ..	3	" ..	109	16		62 ¹ / ₂	"
".....	" 18	" 11	85	27	" ..	3	" ..	133	15		61 ¹ / ₂	"
".....	" 25	" 19	86	26	" ..	23 ¹ / ₄	" ..	129	15	50	61 ¹ / ₂	"

AVERAGE YIELD PER ACRE OF WHEAT SOWN IN WEEK APART TEST—FOR THREE YEARS, 1894, 1893, 1892.

	1894.			1893.			1892.		3 Years.	
	Date of seeding.	Yield per acre.		Date of seeding.	Yield per acre.		Date of seeding.	Yield per acre.	Average yield.	
		Bush. Lbs.			Bush. Lbs.			Bush. Lbs.	Bush. Lbs.	
Red Fife	April 20	9 10	Red Fife...	April 17	24 40	Red Fife ...	April 15..	27 40	20	30
"	" 27	14 10	"	" 24	31 10	"	" 22..	30	25	6
"	May 4	16 20	"	May 1	37	"	Not sown.	.....	26	40
"	" 11	17	"	" 8	32 30	"	May 6..	35 40	28	26
"	" 18	15 20	"	" 15	30	"	" 13..	33	26	6
"	" 25	17 50	"	" 22	29 10	"	" 20..	26 20	24	26
Stanley.	April 20	15 50	Campbell's White Chaff.	April 17	26 30	Campbell's White Chaff.	April 15..	29 40	24	
"	" 27	16 40	" ..	" 24	31 40	" ..	" 22..	38	28	46
"	May 4	15 15	" ..	May 1	30 10	" ..	Not sown.	.....	22	42
"	" 11	16	" ..	" 8	25 30	" ..	May 6..	28 50	23	26
"	" 18	15	" ..	" 15	30	" ..	" 13..	36 40	27	13
"	" 25	15 50	" ..	" 22	29 50	" ..	" 20..	33 20	26	20

TEST OF DRILL, BROADCAST AND PRESS-DRILL SEEDING.

In the above test, Red Fife was used. The land was clay loam, the size of the plots was $\frac{1}{10}$ acre and the three plots were sown on the same day on fallow-land at the rate of $1\frac{1}{4}$ bushel per acre.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				Inch.		Inch.		Lbs.	Bush.	Lbs.	Lbs.
Red Fife, sown by—											
Drill.....	April 24	Aug. 10	109	28	Stiff..	23	Bald..	134	17	50	63
Broadcast.....	" 24	" 16	115	27	" ..	23 ¹ / ₂	" ..	140	11	40	62 ¹ / ₂
Press-drill.....	" 24	" 8	107	27	" ..	24 ¹ / ₂	" ..	140	18	40	62 ¹ / ₂

TEST OF SOWING WHEAT AT DIFFERENT DEPTHS.

This test has been carried on for five years with varying results. In a dry year the deep seeding has an advantage ; in a wet year the opposite is the case. Red Fife was used in all tests ; sown same day on fallow-land ; clay loam ; size of plots, $\frac{1}{10}$ acre.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				Inch.		Inch.		Lbs.	Bush. Lbs.	Lbs.
Red Fife, sown—										
1 inch deep.....	April 24	Aug. 4	103	24	Stiff..	$2\frac{3}{4}$	Bald..	116	15 10	62
2 inches deep.....	" 24	" 6	105	24	" "	$2\frac{3}{4}$	" "	122	15 20	62
3 inches deep.....	" 24	" 6	105	23	" "	$2\frac{3}{4}$	" "	122	18 —	62

TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Red Fife was sown in this test. The three plots were sown on same day, by common drill on fallow-land clay loam, size of plots $\frac{1}{10}$ acre.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.	Weight per Bushel.
				Inch.		Inch.		Lbs.	Bush. Lbs.	Lbs.
Red Fife sown at rate of—										
1 bushel per acre.	April 24	Aug. 6	105	24	Stiff..	$2\frac{3}{4}$	Bald..	124	14 30	$62\frac{1}{2}$
$1\frac{1}{4}$ bushel per acre	" 24	" 4	103	22	" "	$2\frac{3}{4}$	" "	130	11 40	62
$1\frac{1}{2}$ " "	" 24	" 4	103	23	" "	$2\frac{3}{4}$	" "	143	13 20	$62\frac{1}{4}$

AVERAGE YIELD PER ACRE FOR THREE YEARS. IN TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Name of Variety.	1894.		1893.		1892.		3 Years.	
	Date of seeding.	Yield per acre.	Date of seeding.	Yield per acre.	Date of seeding.	Yield per acre.	Average yield.	
		Bush. Lbs.		Bush. Lbs.		Bush. Lbs.	Bush. Lbs.	
Red Fife—								
1 bus. per acre.	April 24..	14 30	April 20..	28 20	May 3....	38 50	27 13	
$1\frac{1}{4}$ " "	" 24..	11 40	" 20..	28 —	" 3....	40 —	26 33	
$1\frac{1}{2}$ " "	" 24..	13 20	" 20..	26 30	" 3....	39 40	26 30	

Showing, in an average of three years, that one bushel gave slightly better returns than either $1\frac{1}{4}$ or $1\frac{1}{2}$ bushels per acre.

CROSS-SEEDING *vs.* ORDINARY SEEDING.

Some inquiry having been made as to the probable result of cross-seeding, two plots of $\frac{1}{10}$ acre each were sown with Red Fife, by drill in fallow land, clay loam. One plot was sown in the ordinary way, first, with 3 pecks per acre, then crossed with the same quantity. The other plot beside it was sown at the rate of $1\frac{1}{2}$ bushels per acre. Following is the result : . .

GRAIN—WHEAT—TEST OF CROSS-SEEDING *vs.* ORDINARY SEEDING.

Name of Variety.	Date of sowing.	Date of Ripening.	No. of days maturing.	Length of straw.	Character of Straw.	Length of head.	Kind of head.	Weight of straw.	Yield per acre.	Weight per bushel.
Red Fife—				Ins.		Ins.		Lbs.	Bu. Lbs.	Lbs.
Cross-seeding, $\frac{3}{4}$ bu. each way	April 24	Aug. 6	105	22	Stiff. . .	$2\frac{3}{4}$	Bald . . .	165	17 30	62 $\frac{1}{2}$
Ordinary seeding, $1\frac{1}{2}$ bu. . .	" 24	" 10	109	23	" . . .	$2\frac{3}{4}$	" . . .	128	17 50	63 $\frac{1}{2}$

SMUT TEST.

The bluestone test for smut was repeated the past season with surprising results. The value of bluestone in killing the germs of smut having been demonstrated in prior tests, an experiment was made the past season with very smutty seed to ascertain how badly the seed may be affected and yet be made safe for seeding purposes. The seed used was the product of the untreated and badly affected seed of the year previous, and was perfectly black and unfit for seed or any purpose whatever. Three plots of $\frac{1}{10}$ acre each were sown on same day on fallow land—when ripe six feet square of each plot was cut and the heads counted; the balance of the plot being cut and threshed. In the untreated plot the product of the 6 feet square contained only 77 good heads of wheat, while 862 were smutty. The plot yielded 5 bushels 40 lbs. of wheat and smut per acre of which about $\frac{1}{2}$ bushel was sound wheat and the balance smut. The plots treated with bluestone were almost perfectly free from smut, as will be seen in result of test given below. While no farmer need or should sow badly affected seed, he may rest assured that, with proper treatment it is perfectly safe to do so. In a few localities a little smut has been found the past season. Where such has been the case it has resulted from one of three causes—1st, using no bluestone—2nd, bluestone used, not very good, or 3rd, not using sufficient water to wet every particle of the wheat treated. In all probability the latter was the principal cause. Not less than $1\frac{1}{2}$ pails water should be used to 10 bushels wheat with 1 lb. bluestone.

ACRE PLOTS.

Nine sorts were sown on the same day on acre plots of fallow land, clay loam, sown by drill, $1\frac{1}{4}$ bush. per acre. Following is result.

TEST OF BLUE-STONE FOR SMUT IN SPRING WHEAT.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Ma- turing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	6 ft. Square.	
Red Fife—				In.		In.		Lbs	Bus. lbs.	Lbs	Good Heads.	Bad Heads.
1 lb. Blue-stone to 10 bus. seeds	April 24	Aug. 10	109	24	Stiff.	$2\frac{3}{4}$	Bald	128	17 50	63 $\frac{1}{2}$	1,000	0
1 " " 7 " . .	" 24	" 10	109	23	"	$2\frac{3}{4}$	"	127	16 40	62	846	3
Untreated.	" 24	" 10	109	20	"	$2\frac{1}{2}$	"	78	5 40	58	77	862

SPRING WHEAT, SOWN ON PLOTS OF ONE ACRE EACH.

Name of Variety.	Date of sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				In.		In.		Bush. Lbs.	Lbs.
White Fife.....	April 20..	Aug. 7..	109	29	Stiff..	3	Bald.	14 —	62½
White Connell.....	" 20..	" 8..	110	27	"	2¾	"	12 —	62½
Stanley.....	" 20..	" 4..	106	27	"	3	"	12 —	61
Red Fern.....	" 20..	" 6..	108	31	Soft.....	3	Bearded..	11 20	61¾
Trial.....	" 20..	" 4..	106	29	"	3	"	10 10	61¾
Ladoga.....	" 20..	" 4..	106	28	"	3	Bearded..	10 —	62
A No. 1.....	" 20..	" 4..	106	31	"	3	"	9 —	62
Johnston's.....	" 20..	" 8..	110	28	Stiff.....	3	Bald.	9 —	62
Ottawa.....	" 20..	" 4..	106	28	Soft.....	3	Bearded..	8 30	62¼

TEST OF DIFFERENT METHODS OF SUMMER FALLOWING.

Red Fife sown on land deep and shallow ploughed summer fallow, clay loam, sown by drill, on plots of 1/10 acre, 1¼ bushels per acre.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush. Lbs.	Lbs.
Red Fife—										
Ploughed deep..	April 20	July 31	102	27	Stiff.	3	Bald. ...	160	16 40	63¼
Ploughed shallow	" 20	" 30	101	26	"	2¾	"	140	12 20	63

TEST of Fall and Spring ploughing and drill on stubble compared with Summer-fallow.

Each year a piece of stubble or root land has been ploughed in the fall and sown with Red Fife in the following spring ; another piece has been gang-ploughed in spring at time of seeding ; and another piece sown by drill without being worked before or after seeding. Along-side, or as near as it has been possible to have it, a piece of fallow has been sown for comparison. The result of this year's test with tests of 1892 and 1893 and average for 3 years is given below.

Mode of Cultivation.	How sown.	Sown.	Headed.	Ripe.	Matured in.	Yield per Acre.
1894.					Days.	Bush. Lbs.
Fall ploughing.....	Drill.....	April 28..	July 10...	Aug. 4...	99	5 —
Seed gang-ploughed in.....	Broadcast.....	" 28..	" 10...	" 8...	103	9 20
Not ploughed.....	Drill.....	" 28..	" 10...	" 4...	99	8 —
Fallow.....	"	" 28..	" 12...	" 10...	105	16 40
1893.						
Fall ploughing.....	Drill.....	May 2...	July 15...	Aug. 21...	112	22 10
Seed gang-ploughed in.....	Broadcast.....	" 2...	" 18...	" 23...	114	31 30
Not ploughed.....	Drill.....	" 2...	" 15...	" 21...	112	29 50
Fallow.....	"	" 3...	" 21...	" 23...	113	37 50
1892.						
Fall ploughing.....	Drill.....	April 14..	July 17...	Aug. 25 ..	134	27 30
Seed gang-ploughed in.....	Broadcast.....	May 16...	" 20...	" 29...	106	22 30
Not ploughed.....	Drill.....	" 16...	" 21...	" 29...	106	21 40
Fallow.....	"	" 12...	" 25...	Sept. 3...	115	30 —

AVERAGE, 3 YEARS—(From above tests.)

Stubble		Bush.	lbs.	
	Fall ploughing.....	18	13	per acre.
	Seed gang-ploughed in.....	21	6	"
	Not ploughed.....	19	50	"
	Fallow-land.....	28	10	"

AVERAGE YIELD PER ACRE FOR THREE YEARS SEEDING OF TEST OF DRILL, BROADCAST AND PRESS-DRILL.

Name of Variety.	1894.		1893.		1892.		3 Years.
	Date of Seeding.	Yield per Acre.	Date of Seeding.	Yield per Acre.	Date of Seeding.	Yield per Acre.	Average Yield.
Red Fife, sown by—		Bush.		Bush.		Bush.	Bush.
Drill.....	April 24..	17·50	May 4..	36·18	May 12..	24·00	26·2
Broadcast.....	" 24..	11·40	" 4..	25·40	" 12..	20·20	19·3
Press-drill.....	" 24..	18·40	" 4..	38·20	" 12..	30·20	29·6

Showing in an average of three years, over three bushels per acre in favour of press-drill *vs.* drill, and nearly 10 bushels in press-drill *vs.* broadcast.

AVERAGE YIELD PER ACRE FOR THREE YEARS IN TEST OF SOWING WHEAT AT DIFFERENT DEPTHS.

Name of Variety.	1894.		1893.		1892.		3 Years.
	Date of Seeding.	Yield per Acre.	Date of Seeding.	Yield per Acre.	Date of Seeding.	Yield per Acre.	Average Yield.
Red Fife, sown—		Bush.		Bush.		Bush.	Bush.
1 inch deep.....	April 24..	15·10	May 4..	Blown out	April 20..	24·30	19·50*
2 "	" 24..	15·20	" 4..	41·20	" 20	27·00	27·53
3 "	" 24..	18·00	" 4..	37·10	" 20..	22·30	25·50

* 2 years.

In 1893, the one inch in depth was destroyed by winds, so that in this test the average is for two years only. The tests of one inch in depth show that depth to be not sufficient to resist winds and dry weather. The three inches deep, the past year gave nearly three bushels more per acre than either one or two inches, while the average for three years is in favour of two inches by two bushels per acre.

CROSS-BRED WHEATS.

In the cross-bred varieties of wheat little or no difference could be seen between the different varieties while growing.

When threshed, however, considerable difference was found in yield and quality of the grain, but on account of the season being so unfavourable, a just estimate cannot be made of their value from this year's results. Following will be found names, parentage, date of sowing and ripening, weight and yield of the hybrids :—

Name of Variety.	Parentage.		Sown.	Ripe.	Yield.		Weight per Bushel.
	Male.	Female.			Bush.	lbs.	Lbs.
Major.....	White Fife	Ladoga.....	April 21..	Aug. 8..	19	20	61 $\frac{3}{4}$
Percy.....	Red Fife	".....	" 21..	" 10..	19	10	62 $\frac{1}{4}$
Preston.....	"	".....	" 21..	" 8.	18	20	63
Huron.....	White Fife	".....	" 21..	" 10..	17	30	62 $\frac{3}{4}$
Crown.....	"	".....	" 21..	" 8..	17	—	62 $\frac{1}{2}$
Advance.....	Red Fife	".....	" 21..	" 8..	16	40	62 $\frac{1}{4}$
Alpha.....	White Fife	".....	" 21..	" 10..	16	40	62 $\frac{1}{4}$
Blenheim.....	"	".....	" 21..	" 10..	15	50	62
Stanley.....	Red Fife	".....	" 21..	" 8..	15	30	60 $\frac{3}{4}$
Ottawa.....	"	".....	" 21..	" 6..	15	30	61 $\frac{1}{4}$
Captor.....	White Fife	".....	" 21..	" 8..	15	—	61 $\frac{3}{4}$
A. No. 1..	Red Fife	".....	" 21..	" 8..	13	20	61 $\frac{1}{2}$

GENERAL RESULTS OF WHEAT TESTS, 1894 AND 1892-93-94.

- 1. In the result of the tests made the past season, no one variety of wheat has proved much superior to the others as far as yield is concerned, but in quality the following were much the best:—
Preston, Pringle's Champlain, Rio Grande, Wellman's Fife, Dions, Huron, Red Fern, Red Fife, White Russian, White Connell, White Fife, Mars, Gehun, and Herisson Bearded.
- 2. In the week apart tests, the average of three years points to the season between 20th April and 20th May, as being the proper time to sow wheat as far as yield is concerned, but frost is not taken into account in these tests and should be considered.
- 3. The average of three years' trial of Press-drill, Drill and Broadcast sowing is in favour of the Press-drill very considerably.
- 4. One bushel of seed per acre has given best results in three years' tests.
- 5. Wheat sown three inches deep gave best results the past season, but the average for three years is in favour of seeding 2 inches deep.
- 6. No gain resulted from Cross-seeding in the test of the past season, and if time in sowing is considered, a loss took place.
- 7. Fallow-worked land, as it always has done, gave the best returns.
- 8. Treating seed wheat with Blue-stone has again demonstrated its great value in killing the smut-germs and saving the grain from being perfectly useless.

BARLEY.

Twenty-nine varieties of barley were sown last spring, of which 17 were old and 12 new sorts, 15 kinds being 2-rowed and 14 varieties 6-rowed. The 12 new sorts included 6 hybrids, produced at the Central Experimental Farm by crossing 2-rowed with 6-rowed barleys, some of which are very promising, but on account of the extremely dry season gave poor returns.

TEST OF VARIETIES ALL SOWN THE SAME DAY.

Twenty-eight varieties were sown the same day by drill on $\frac{1}{10}$ acre plots of fallow land, sandy loam ; all the plots were promising until dry weather set in. As will be seen by the following results, the yield was small in every case.

BARLEY—TEST OF DIFFERENT VARIETIES SOWN THE SAME DAY.

Name of Variety.	Date of sowing.		Date of ripening.		No. of days maturing.	Length of straw.	Character of straw.	Length of head.	Kind of head.	Weight of straw.	Yield per acre.		Weight per bushel.
						Ins.		Ins.		Lbs	Bus. lbs.	Lbs	
Odessa.....	May	10	Aug.	1	83	20	Stiff	2	6 rowed.	125	23	36	48 $\frac{3}{4}$
Oderbruch	"	10	July	28	79	18	"	2	"	109	22	44	51 $\frac{1}{4}$
Danish Chevalier.....	"	10	Aug.	11	93	18	"	3	2 "	116	21	42	53 $\frac{3}{4}$
Rigid.....	"	10	"	1	83	19	"	2 $\frac{1}{4}$	6 "	109	20	—	52 $\frac{1}{2}$
Mensury.....	"	10	"	1	83	18	"	2 $\frac{3}{4}$	"	113	19	38	48
Kinver Chevalier....	"	10	"	10	92	18	"	3	2 "	111	19	18	54
Royal	"	10	"	1	83	16	"	2 $\frac{1}{4}$	6 "	100	19	8	49
Rennie's Improved ..	"	10	"	10	92	18	"	2	"	109	18	36	53
Thanet.....	"	10	"	12	94	19	"	3	2 "	120	18	36	54 $\frac{3}{4}$
Phoenix.....	"	10	"	8	90	18	"	2 $\frac{1}{2}$	6 "	108	17	34	50
Prize Prolific.....	"	10	"	11	93	19	"	3	2 "	119	17	34	53 $\frac{1}{4}$
Petschora.....	"	10	"	1	83	16	"	2 $\frac{3}{4}$	6 "	102	16	42	45
Trooper.....	"	10	"	10	92	16	"	2 $\frac{1}{2}$	"	101	16	42	51
Beaver.....	"	10	"	10	92	18	"	3	2 "	114	16	32	54 $\frac{1}{2}$
Common, six-rowed.....	"	10	"	1	83	16	"	2	6 "	99	16	12	48 $\frac{1}{2}$
Baxter's six-rowed.....	"	10	"	1	83	19	"	2	"	119	15	30	48
Summit.....	"	10	"	10	92	19	"	2 $\frac{1}{2}$	"	121	15	30	52
California Prolific.....	"	10	"	11	93	18	"	2 $\frac{1}{2}$	2 "	112	15	30	53
Newton.....	"	10	"	9	91	18	"	2 $\frac{1}{2}$	"	110	15	30	53 $\frac{1}{2}$
Improved Chevalier	"	10	"	11	93	18	"	3	"	112	15	30	53 $\frac{1}{4}$
Bolton.....	"	10	"	6	88	22	"	2 $\frac{3}{4}$	"	128	15	—	54 $\frac{3}{4}$
Surprise.....	"	10	"	11	93	15	"	2 $\frac{1}{2}$	6 "	6	12	24	53 $\frac{1}{2}$
Victor.....	"	10	"	9	91	20	"	2 $\frac{1}{2}$	"	122	12	24	53 $\frac{1}{2}$
Canadian Thorpe.....	"	10	"	11	93	18	"	2 $\frac{3}{4}$	2 "	115	12	24	54
Sidney.....	"	10	"	10	92	19	"	2 $\frac{3}{4}$	"	121	12	24	53 $\frac{3}{4}$
Duckbill.....	"	10	"	11	93	18	"	2 $\frac{1}{2}$	"	110	11	32	53 $\frac{3}{4}$
Type L—Hyb.....	"	10	"	11	93	19	"	2 $\frac{1}{4}$	"	122	10	20	54
Pioneer.....	"	10	"	1	83	19	"	2 $\frac{1}{2}$	"	119	6	34	52 $\frac{1}{2}$

RESULT OF SOWING BARLEY AT DIFFERENT DATES ON $\frac{1}{10}$ ACRE PLOTS.

In this test Canadian Thorpe, a two-rowed sort, and Oderbruch, a six-rowed variety, were used. The soil was clay loam.

All the plots of two-rowed were poor ; the first two sown being very short and weak in the straw. The six-rowed, on the other hand, while short in straw, stood the dry weather much better and ripened evenly, in the order sown, several days earlier than the two-rowed.

The best time to sow barley, as indicated by the results of this test, is from 1st to 15th May, these dates being substantiated by the results of the same test for the past three years.

In addition to this year's test, the dates of seeding and yields for 1893 and 1892 are given with average yield for the 3 years.

BARLEY—RESULTS OF EARLY, MEDIUM AND LATE SOWING.

Name of variety.	Date of sowing.	Date of ripening.	No. of days maturing.	Length of straw.	Character of straw.	Length of head.	Kind of Head.	Weight of straw.	Yield per acre.		Weight per bushel.
				Ins.		Ins.		Lbs	Bus. lbs.	Lbs	
Canadian Thorpe.....	Apr. 24	Aug. 4	103	24	Stiff	23	Good.	90	11	12	53
“.....	May 1	“ 20	112	18	“	23	“	82	10	—	54
“.....	“ 8	“ 4	89	18	“	23	“	96	13	26	53
“.....	“ 15	“ 20	98	16	“	23	“	95	13	26	53 ¹ / ₂
“.....	“ 22	“ 14	85	20	“	23	Fair.	93	12	36	52 ¹ / ₂
“.....	“ 29	“ 14	78	20	“	23	“	85	11	32	51 ¹ / ₂
Oderbruch.....	Apr. 24	Aug. 1	107	18	“	2	Good	96	14	18	52
“.....	May 1	“ 1	93	18	“	2	Fair.	100	20	20	50 ¹ / ₂
“.....	“ 8	“ 4	87	17	“	2	Good	99	19	28	53 ¹ / ₄
“.....	“ 15	“ 2	82	16	“	2	“	100	21	22	51 ¹ / ₄
“.....	“ 22	“ 9	80	18	“	2	“	97	15	—	52 ³ / ₄
“.....	“ 29	“ 11	75	19	“	2	“	96	15	—	52 ¹ / ₂

AVERAGE yield per acre, for three years, of barley sown in week-apart test, 1894-93-92.

Name of Variety.	1894.			1893.			1892.		3 Years.
	Date of Seeding.	Yield per acre.		Date of Seeding.	Yield per acre.		Date of Seeding.	Yield per acre.	Average Yield.
		Bush. lbs.			Bush. lbs.			Bush. lbs.	Bush. lbs.
Canadian Thorpe	April 24..	11 12	Duck-bill.	April 24..	35 00		April 18..	18 40	21 33
“.....	May 1..	10 00		May 1..	43 06		“ 25..	34 24	29 10
“.....	“ 8..	13 26		“ 8..	42 04		Not sown.		27 39*
“.....	“ 15..	13 26		“ 15..	37 44	May 9..	30 10		27 10
“.....	“ 22..	12 36		“ 22..	32 34	“ 16..	36 00		27 07
“.....	“ 29..	11 32		“ 29..	26 12	“ 23..	31 06		23 04
Oderbruch.....	April 24..	14 18	Baxter's Six-rowed.	April 24..	36 42		April 18..	35 40	29 01
“.....	May 1..	20 20		May 1..	42 24		“ 25..	41 12	34 34
“.....	“ 8..	19 28		“ 8..	40 00		Not sown.		29 38*
“.....	“ 15..	21 22		“ 15..	30 10	May 9..	41 32		31 05
“.....	“ 22..	15 00		“ 22..	30 00	“ 16..	46 32		30 27
“.....	“ 29..	15 00		“ 29..	31 22	“ 23..	44 22		30 15

* Two years only.

FIELD PLOTS OF BARLEY.

Four field lots were sown on May 8th, in fields of 3 acres each. The varieties of seed chosen for these were among the best two-rowed sorts. The soil was a clay loam.

All lots came up evenly and promised well at first, but later on they came to a standstill and for a long time made very little growth, and when the heads struggled through, they were very short and poorly filled. The following are the results :—

BARLEY IN FIELD PLOTS OF 3 ACRES EACH.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush, Lbs.	Lbs.
Newton.....	May 8..	Aug. 15	100	18	Stiff..	2½	2-rowed ..	1,500	19 20	54½
California Prolific..	" 8..	" 14	99	18	"	2½	" ..	1,450	18 30	52½
Kinver Chevalier...	" 8..	" 15	100	16	"	3	" ..	1,325	16 —	53
Goldthorpe.....	" 8..	" 15	100	17	"	2½	" ..	1,200	14 20	52½

TEST OF PRESS-DRILL vs. DRILL.

In this test the plots were $\frac{1}{10}$ of an acre, clay loam : the results, as will be seen in the following table, are in favour of ordinary drill by 2 bushels 4 lbs. per acre. In 1893 the returns were in favour of press-drill by 7 bushels per acre.
The plots were on summer fallow, and seed was sown at the rate of 2 bushels per acre and both on the same day.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Head.	Weight of Straw per acre.	Yield per acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush. Lbs.	Lbs.
California Prolific—										
Drill.....	May 15.	Aug. 20	98	18	Stiff..	2½	Good.....	122	16 12	53½
Press-drill.....	" 15.	" 17	95	17	"	2½	"	113	14 8	52½

TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

In the above test which was made on clay loam on plots of $\frac{1}{10}$ acre each, 1½ bushels per acre sown on May 15th yielded 13 bush. and 36 lbs. per acre, and 1¾ bushels sown same date produced 15 bush. and 30 lbs. per acre. The same variety (California Prolific) and the same quantities of seed sown May 8th, 1893, gave 43 bush. 44 lbs. and 44 bush. and 28 lbs. respectively, per acre. In this year's test the two plots were sown on fallow by drill.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Head.	Weight of Straw per acre.	Yield per acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush. Lbs.	Lbs.
California Prolific—										
1¾ bush. per acre..	May 15.	Aug. 20	98	16	Stiff..	2½	Good.....	106	15 20	51½
1¼ do ...	" 15.	" 20	98	17	"	2½	"	124	13 36	52

TEST OF BLUESTONE FOR SMUT IN BARLEY.

For several years many of the varieties of barley have been affected with smut. Bluestone having been used on seed in spring of 1893, with satisfactory results, a test was made during the past season which also proved satisfactory.

The plots were $\frac{1}{10}$ of an acre each, soil, clay loam, and they were all sown on the same day, at the rate of 2 bushels per acre, by drill on fallow-land, with the following results:—

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Good Heads.	Bad Heads.
				Inch.		Inch.		Lbs.	Bush. Lbs.	Lbs.		
California Prolific— 1 lb. Bluestone to 10 bushels seed.....	May 15.	Aug. 20	98	19	Stiff..	2 $\frac{3}{4}$	Good...	126	.....	....	600	0
1 lb. Bluestone to 7 bushels seed.....	" 15.	" 20	98	19	" ..	2 $\frac{1}{2}$	" ...	123	.....	....	570	0
Untreated	" 15.	" 20	98	15	" ..	2 $\frac{1}{2}$	Uneven.	86	.....	....	488	27

TEST OF STUBBLE *vs.* FALLOW.

California Prolific barley was used in this test on $\frac{1}{10}$ acre plots, clay loam.

The stubble land had been under wheat the year previous and was fallowed the year before that. This spring the stubble was gang-ploughed 3 inches deep. Seed sown before ploughing and land well harrowed after.

The fallow yielded 16 bushels 30 lbs. and the stubble 7 bushels 34 lbs. per acre. The same variety sown on fallow on May 9th, 1893, gave 49 bushels 10 lbs. and stubble (fall ploughed) 41 bushels 32 lbs. per acre.

Plots sown by drill at the rate of 2 bushels per acre.

STUBBLE *vs.* FALLOW.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
				Inch.		Inch.		Lbs.	Bush. Lbs.	Lbs.	
California Prolific— Stubble-ganged....	May 14.	Aug. 15	94	12	Stiff..	2 $\frac{1}{4}$	Small ..	73	7 34	47 $\frac{1}{2}$	Not rusted.
Fallow.....	" 15.	" 20	98	17	" ..	2 $\frac{3}{8}$	Good...	109	16 30	53	"

GENERAL RESULTS OF BARLEY GROWING FOR SEASON OF 1894.

1. In the test of varieties sown on same date, no one variety proved much superior to the others, all suffering from prolonged dry, hot weather.

2. In the week-apart tests, the plots sown between 1st and 15th May, gave the best results, and in 1892 and 1893, the plots sown during that period also gave the best returns.

3. One and three quarter bushels per acre has given better results in this year's test and in test of 1893 than 1 $\frac{1}{4}$ bushels.

4. Blue-stone kills smut germs on barley, and should be generally used.

5. Fallow-land gave a fair return this year, while grain on stubble-land was not worth cutting.

OATS.

The oat crop throughout the Territories suffered greatly from the dry and hot weather during the growing season. Where the crop was sown on fallow-land, fair, and

in some localities where rain favoured them, good returns were obtained ; but the general practice being to sow oats after two or more crops of wheat have been taken off the land, often without ploughing, the result in many districts has been an almost or entire failure of the oat-crop.

On the Experimental Farm, the crop suffered from lack of rain, quite as much as in other sections, and, on any land except fallowed, was hardly worth cutting.

One field of 5 acres promised so poorly that it was ploughed up. Two other fields of 10 and 20 acres each in extent, sown on stubble-land, were hardly worth cutting.

These fields were sown for fodder purposes, but on account of the straw being so short were allowed to remain and cut when ripe.

On fallow-land, the crop was fair, the straw of all varieties being short and thin on the ground, but producing fairly good returns considering the unfavourableness of the season.

TEST OF SOWING DIFFERENT VARIETIES OF OATS ON SAME DATE.

Thirty-nine varieties were sown the same day on fallow, by drill at the rate of 2½ bushels per acre.

Many of these plots were injured after the grain was 5 or 6 inches high by winds blowing soil from adjacent fallow through them, thereby injuring the tender blades.

The results of the test are given in the following table :—

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.	Weight per Bushel.
						In.		In.		lbs. bush.	lbs.	lbs.
Columbus	Clay loam . .	1 ¹ / ₁₀ acre..	May 4..	Aug. 8.	96	29	Weak	5	Branch .	104 27	32	421 ¹ / ₄
Abyssinia	" . .	" . .	" . .	" 8.	96	24	Stiff..	5 ¹ / ₂	Sided...	104 27	32	41
Banner	" . .	" . .	" . .	" 2.	90	29	" . .	7	Branch .	105 27	12	371 ¹ / ₂
Holstein Prolific..	" . .	" . .	" . .	" 6.	94	25	Weak	5 ¹ / ₂	" . .	108 27	2	40
American Triumph	" . .	" . .	" . .	" 4.	92	24	" . .	6 ¹ / ₂	" . .	109 26	16	391 ¹ / ₂
Bavarian	" . .	" . .	" . .	" 10.	98	29	" . .	6 ¹ / ₂	" . .	104 25	30	37 ¹ / ₂
Imported Irish....	" . .	" . .	" . .	July 28.	85	26	" . .	5	" . .	113 25	—	44 ¹ / ₄
Poland	" . .	" . .	" . .	" 28.	85	24	Stiff..	6	" . .	105 25	—	42 ¹ / ₄
Golden Beauty....	" . .	" . .	" . .	Aug. 6.	94	26	" . .	6 ¹ / ₂	" . .	102 25	—	39 ¹ / ₂
Abundance	" . .	" . .	" . .	" 8.	96	26	Weak	6	" . .	108 25	—	39 ¹ / ₄
Oderbruch	" . .	" . .	" . .	" 9.	97	29	" . .	6	Sided...	108 24	24	41 ¹ / ₄
Improved Ligowo.	" . .	" . .	" . .	" 1.	89	26	" . .	5	Branch .	110 24	4	40 ¹ / ₂
Wallis	" . .	" . .	" . .	" 9.	97	30	" . .	6	" . .	105 24	4	39 ¹ / ₄
American Beauty..	" . .	" . .	" . .	" 8.	96	25	Stiff..	6 ¹ / ₂	" . .	108 23	18	40 ¹ / ₂
Cream Egyptian..	" . .	" . .	" . .	" 1.	89	28	" . .	8	Sided...	120 22	32	43
White Russian....	" . .	" . .	" . .	" 8.	96	25	" . .	6	" . .	104 22	32	41 ¹ / ₂
California Prolific	" . .	" . .	" . .	" 10.	98	26	" . .	6 ¹ / ₂	" . .	108 22	32	37
Early Etampes....	" . .	" . .	" . .	" 4.	92	26	Weak	5	Branch .	103 22	22	37 ¹ / ₂
Rosedale	" . .	" . .	" . .	" 4.	92	25	Stiff..	5	Sided...	105 22	12	42 ¹ / ₄
Rennie's Prize	" . .	" . .	" . .	July 27.	84	27	" . .	7	Branch .	105 22	2	42
White	" . .	" . .	" . .	" . .	" . .	" . .	" . .	" . .	" . .	" . .	" . .	" . .
Early Gothland..	" . .	" . .	" . .	Aug. 8.	96	27	" . .	5	Sided...	109 22	2	41 ¹ / ₂
White Wonder...	" . .	" . .	" . .	July 27.	84	30	" . .	8 ¹ / ₂	Branch .	105 22	2	42 ¹ / ₂
Lincoln	" . .	" . .	" . .	Aug. 6.	94	30	Weak	6	" . .	109 22	2	41
Joanette	" . .	" . .	" . .	" 4.	92	24	" . .	5	" . .	104 21	26	391 ¹ / ₂
Scottish Chief....	" . .	" . .	" . .	July 27.	84	24	Stiff..	6	" . .	102 21	6	41 ¹ / ₄
Siberian	" . .	" . .	" . .	Aug. 9.	97	27	Weak	5 ¹ / ₂	Sided...	109 21	6	39
Golden Giant	" . .	" . .	" . .	" 10.	98	24	" . .	6	" . .	116 21	6	37
Early Archangel..	" . .	" . .	" . .	" 1.	89	27	" . .	7	Branch .	100 20	20	42 ¹ / ₂
Black Coulommiers	" . .	" . .	" . .	" 13.	101	22	" . .	6	" . .	110 20	20	36 ¹ / ₄
Black Tartarian...	" . .	" . .	" . .	" 10.	98	27	" . .	6	Sided...	109 20	20	38 ¹ / ₄
Bonzanza	" . .	" . .	" . .	July 26.	83	22	Stiff..	6	Branch .	139 20	—	43
Giant Cluster	" . .	" . .	" . .	Aug. 8.	96	24	Weak	6	Sided...	109 20	—	37 ¹ / ₂
Welcome	" . .	" . .	" . .	July 26.	83	23	" . .	6	Branch .	104 20	—	42
Flying Scotchman.	" . .	" . .	" . .	Aug. 1.	89	26	Stiff..	4 ¹ / ₂	" . .	107 19	4	43 ¹ / ₄
English White....	" . .	" . .	" . .	" 8.	96	27	" . .	8	" . .	117 19	4	37 ¹ / ₂
Early Blossom....	" . .	" . .	" . .	" 8.	96	25	Weak	6 ¹ / ₂	Sided...	108 18	8	40 ¹ / ₂
White Monarch....	" . .	" . .	" . .	" 8.	96	18	" . .	5 ¹ / ₂	Branch .	113 17	32	39 ¹ / ₂
Prize Cluster	" . .	" . .	" . .	July 26.	83	22	Stiff..	6	" . .	100 17	22	43 ¹ / ₄
Doncaster	" . .	" . .	" . .	Aug. 4.	92	24	Weak	5	" . .	100 15	30	40 ¹ / ₄

YIELDS of four principal varieties of oats for five years with average results.

Name of Variety.	Year.	Yield.	Average.	Name of Variety.	Year.	Yield.	Average.
		Bus. lbs.	Bush. lbs.			Bus. lbs.	Bush. lbs.
Prize Cluster.....	1890	63 ..	} 55 8	Welcome.....	1890	74 30	} 59 6
“.....	1891	84 30		“.....	1891	78 18	
“.....	1892	46 26		“.....	1892	44 ..	
“.....	1893	64 ..		“.....	1893	78 18	
“.....	1894	17 22		“.....	1894	20 ..	
Banner.....	1890	58 20	} 58	Black Tartarian.....	1890	74 30	} 60 16
“.....	1891	86 24		“.....	1891	89 20	
“.....	1892	51 15		“.....	1892	Bl'n out.	
“.....	1893	66 ..		“.....	1893	56 26	
“.....	1894	27 12		“.....	1894	20 20	

TEST OF SOWING PLOTS OF OATS A WEEK APART.

Two sorts of oats, Banner and Abundance, were used in this test on plots of $\frac{1}{10}$ acre each. Commencing on April 24 they were sown the same day of each week for six consecutive weeks on fallow-land by drill at the rate of $2\frac{1}{2}$ bushels per acre.

The first sown plot of each variety was poor from the time it came up, and gave small returns, indicating that the earliest date of seeding was rather too early for oats.

The sowings of the second, third and fourth weeks gave the best results in earliness, straw and yield.

The dates of seeding and yields for same test in 1892 and 1893 are added to this year's test, and, as will be seen by the average of 3 years, the plots sown between 1st and 15th May gave the best returns.

OATS.—TEST OF EARLY MEDIUM AND LATE SEEDING.

Name of Variety.	1894.						1893.			1892.			3 Years.
	Sown.	Headed.	Ripe.	Matured in	Yield per Acre.	Weight.	—	Sown.	Yield.	—	Sown.	Yield.	Average.
				days.	bush. lbs.	lbs.			bush. lbs.			bush. lbs.	bush. lbs.
Banner.....	Apr. 24	July 11	Aug. 9	108	19 4	38	Banner.	Apr. 24	88 28	Banner.	Apr. 18	38 18	48 28
“.....	May 1	“ 9	“ 4	96	30 30	36		May 1	76 20		“ 25	51 6	52 30
“.....	“ 8	“ 8	“ 4	89	27 32	36½		“ 8	86 6		May 9	51 15	55 6
“.....	“ 15	“ 11	“ 8	86	30 30	35½		“ 15	87 12		“ 16	51 6	56 16
“.....	“ 22	“ 14	“ 9	80	21 6	36½		“ 22	53 ..		“ 23	59 24	47 33
“.....	“ 29	“ 18	“ 9	73	22 2	37		“ 29	61 26		“ 30	60 20	48 5
Abundance..	Apr. 24	July 10	Aug. 7	106	17 22	36	Prize Cluster.	Apr. 24	72 2	Prize Cluster.	Apr. 18	25 ..	38 8
“.....	May 1	“ 7	“ 4	96	33 28	35		May 1	66 6		“ 25	47 22	49 7
“.....	“ 8	“ 7	“ 4	89	29 14	35		“ 8	60 30		May 9	44 4	44 27
“.....	“ 15	“ 9	“ 8	86	29 14	37		“ 15	56 10		“ 13	45 10	43 22
“.....	“ 22	“ 12	“ 10	81	23 18	37½		“ 22	58 20		“ 23	52 32	45 ..
“.....	“ 29	“ 15	“ 10	74	28 18	37		“ 29	46 6		“ 30	45 20	40 3

OATS—ONE ACRE PLOTS.

Twenty varieties were sown in acre plots on clay-loam fallowed ; they were sown by drill on the same day. Wind hurt a portion of all the plots, but Hazlett's Seizure, Flying Scotchman, Winter Grey and Bonanza suffered the most.

OATS, ACRE LOTS.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
						In.		In.		Lbs.	Bush.	Lbs.
Hazlett's Seizure....	Clay-loam ..	1 acre.	May 2.	Aug. 8.	92	30	Stiff..	8	Branch.	1,550	37	14 40½
Cream Egyptian....	" ..	1 "	" 2.	" 1.	92	26	" ..	8½	Sided...	1,400	35	16 44
Rennie's Prize White	" ..	1 "	" 2.	July 28.	88	26	" ..	8	Branch.	1,125	34	15 43½
Banner.....	" ..	1 "	" 2.	Aug. 8.	99	26	" ..	8	" ..	1,230	34	4 40½
Flying Scotchman ..	" ..	1 "	" 2.	July 27.	87	25	" ..	5	" ..	1,100	32	5 41½
White Russian.....	" ..	1 "	" 2.	Aug. 8.	99	29	" ..	7	Sided...	1,250	32	— 39½
Scottish Chief.....	" ..	1 "	" 2.	" 1.	92	26	" ..	6½	Branch.	1,125	31	32 40½
Early Gothland.....	" ..	1 "	" 2.	" 6.	97	27	" ..	6	Sided...	1,120	30	29 40½
Golden Beauty.....	" ..	1 "	" 2.	" 8.	99	30	" ..	6½	Branch.	1,100	30	21 40½
Oderbruch.....	" ..	1 "	" 2.	" 8.	99	26	Weak	6	Sided...	1,175	28	— 42½
English White.....	" ..	1 "	" 2.	" 1.	92	25	Stiff..	8	Branch.	1,240	27	20 38½
Welcome.....	" ..	1 "	" 2.	July 28.	88	26	Weak	6	" ..	1,130	27	11 43½
Winter Grey.....	" ..	1 "	" 2.	Aug. 1.	92	26	Stiff..	6½	" ..	1,070	26	10 42½
Abyssinia.....	" ..	1 "	" 2.	" 11.	102	24	" ..	6	" ..	1,060	24	6 41
Bonanza.....	" ..	1 "	" 2.	" 1.	92	25	" ..	6½	" ..	1,400	21	28 42½
Siberian.....	" ..	1 "	" 2.	" 10.	101	27	Weak	6	Sided...	1,095	21	4 41
Victoria Prize White	" ..	1 "	" 2.	" 1.	92	24	" ..	7	Branch.	1,100	18	18 43½
Poland White.....	" ..	1 "	" 2.	" 2.	93	22	Stiff..	6	" ..	1,040	14	30 43
Black Tartarian.....	" ..	1 "	" 2.	" 11.	102	23	Weak	6	Sided...	990	12	10 37½
Royal Doncaster....	" ..	1 "	" 2.	" 8.	99	22	" ..	5½	Branch.	1,050	11	— 38½

TEST OF FALLOW vs. STUBBLE.

Two fields, nearly adjoining, of ten acres each, were sown at the same time with 2½ bushels of seed per acre. The plot of fallowed land was sown by drill : the stubble plot was burnt off and the seed sown on the surface by broadcast seeder and gang-ploughed in.

A second field of stubble of 20 acres was burnt off and sown by drill, without ploughing, with 2½ bushels of seed per acre.

For a considerable time the 10 acre field of stubble was very promising, but at last it dried up and was with difficulty cut with the binder. On the 20 acre field of stubble the straw was longer and gave better returns. On the fallow, although the straw was short, the returns were fairly good.

In the following table the results are given.

OATS FALLOW vs. STUBBLE.

Name of Variety.	Date of sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of straw.	Length of Head.	Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				Inches.		Inches.		Lbs.	Bus. lbs.	Lbs.
Prize Cluster—										
Fallow.....	April 25	July 27...	93	25	Stiff..	6	Good.	13000	27 10	42½
Stubbleganged in spring	" 25	" 25...	91	23	" ..	6	Small.	8000	7 16	40
" drilled in "	" 25	" 25...	91	25	" ..	6	" ..	8500	10 6	40

TEST OF SEEDING, PRESS vs. DRILL.

In this test the Banner oat was used and sown in fallowed land at the rate of 2½ bushels per acre.

The press-drill gave 7 bushels 12 lbs. more per acre than ordinary drill and yield of straw was also larger.

As shown in the table the press-drill gave the best returns in 1893 and is 10 bushels 25 lbs. ahead in the average for the two years. The test made in 1892 was badly destroyed by winds and cannot be given.

PRESS-DRILL vs. DRILL.

Name of Variety.	Character of soil.	Size of Plot.	Date of Sowing	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Average, 2 yrs.
1894.						Inch's		Inch's		Lbs.	Bush.	Lbs.	Bush.
Banner—													
Press-drill.	Clay lo'm	1/10 acre.	May 4	Aug. 1.	90	26	Stiff	7	Good.	1130	32	12	Press-dr.,
Drill.....	“	“	“ 4	“ 4.	93	26	“	7	“	1075	25	40	Drill,
1893.													
Press-drill.	Clay lo'm	1/10 acre.	May 12	.....	.....	.....	.....	.....	.....	.....	100		
Drill.....	“	“	“ 12	.....	.....	.....	.....	.....	.....	.....	85	30	

TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Banner oats were used in this test. Sown on one-tenth acre plots of fallow by drill. Two plots were sown at the rate of 2 bushels and 2½ bushels per acre respectively and one plot alongside, cross-seeded with ¾ bushels per acre, each way.

In this year's test 2 bushels per acre and the cross-sown plot gave the same yield, both being higher in yield than the plot sown at the rate of 2½ bushels per acre. The straw on the cross-sown plot was several inches higher than either of the other two.

Following are the results of this year's test, with date of seeding and yield for 1893 and average for the two years.

Banner Oats, Quantity per Acre and how sown.	1894.							1893.		2 Years.	
	Sown.	Headed.	Ripe.	Matur- ed in.	Yield per Acre.	Weight per Bushel.		Sown.	Yield.	Average	
				Days.	Bus. lbs.	Lbs.			Bus. lbs.	Bus. lbs.	
2 bushels.....	May 4	July 7	Aug. 4	93	32 12	37		May 8	97 32	65 5	
2½ “.....	“ 4	“ 7	“ 4	93	28 8	37		“ 8	89 14	58 28	
Cross-seeding, ¾ bushel..	“ 4	“ 7	“ 4	93	32 12	37		.....	.....	.....

GENERAL RESULTS OF OAT-GROWING FOR SEASON OF 1894.

1. Of the 39 sorts tested, sown on same day, where all had equal chances, the varieties:—Banner, White Wonder, Bonanza, Imported Irish, Rosedale, Improved Ligowo and Abyssinia proved themselves good kinds for the North-west Territories.

2. In the test made with a view of determining the best time to sow oats, the period between 1st and 15th May gave the best returns, corresponding in this respect with the same test in 1893 and 1892.

3. In the test of Stubble *vs.* Fallow it is clearly demonstrated that fallowed-land gives very much better returns, both in straw and yield, than stubble-land, no matter how put in.

4. The press-drill gave better results than ordinary drill.

5. Two bushels of seed per acre gave a greater yield than the ordinary quantity, $2\frac{1}{2}$ bushels, and cross-seeding, taking twice the labour at seeding time, was no better than the plots sown in the usual way.

PEASE.

Twelve varieties of pease were sown on $\frac{1}{10}$ acre plots of fallow soil clay loam. Three of these sorts were again sown in larger plots.

All the kinds were short in straw and when threshed gave small yields, but the sample was good in all cases.

PEASE.—DIFFERENT VARIETIES SOWN SAME DAY.

Name of Variety.	Character of soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw	Character of Straw.	Length of Pod.	Pod.	Yield per Acre.	Weight per Bushel.
						inch.		inch.		bush. lbs. lbs.	
Golden Vine	Clay loam.	$\frac{1}{10}$ acre	May 7..	Aug. 3..	89	20	Bright..	$1\frac{1}{2}$	Well filled	19 10	$64\frac{1}{2}$
Canadian Beauty..	" ..	"	" 7..	" 6..	92	19	" ..	$2\frac{1}{2}$	"	15 40	64
Mummy.....	" ..	"	" 7..	" 4..	90	20	" ..	2	"	15 30	$64\frac{1}{2}$
Crown.....	" ..	"	" 7..	" 3..	89	17	" ..	2	"	14 30	$64\frac{1}{2}$
Pride.....	" ..	"	" 7..	" 3..	89	18	" ..	2	"	11 50	64
Multiplier.....	" ..	"	" 7..	" 6..	92	20	" ..	2	"	11 40	64
Potter	" ..	"	" 7..	" 6..	92	20	" ..	3	"	11 40	$64\frac{1}{2}$
Centennial.....	" ..	"	" 7..	" 6..	92	20	" ..	$2\frac{1}{2}$	"	11 10	65
White Marrowfat..	" ..	"	" 7..	" 6..	92	21	" ..	$2\frac{1}{2}$	"	11 ..	$63\frac{1}{2}$
Prussian Blue.....	" ..	"	" 7..	" 2..	88	17	" ..	$1\frac{1}{2}$	"	10 10	$64\frac{1}{2}$
Prince Albert....	" ..	"	" 7..	" 2..	88	18	" ..	2	"	10 4	63
Black Eyed Marrowfat.....	" ..	"	" 7..	" 6..	92	19	" ..	$2\frac{1}{2}$	"	9 40	63

FIELD-LOTS.

Mummy	Clay loam.	.. ..	May 7..	Aug. 6..	92	20	Bright..	2	Well filled	17 ..	$64\frac{1}{2}$
Multiplier .....	" ..	.....	" 7..	" 6..	92	20	" ..	2	"	12 35	$64\frac{1}{2}$
Pride.....	" ..	.....	" 7..	" 1..	87	18	" ..	2	"	11 10	64

FODDERS.

GRASSES.

Except on one variety, no satisfactory report can be made this year on grasses. Out of 16 varieties sown in the spring of 1892, only one is now living. Several were blown out and others dried out the first year and of the balance only two gave a crop in 1893, namely : *Bromus inermis* and *Muhlenbergia sylvatica*, the others being so short it was impossible to cut them.

All except *Bromus inermis* promised so poorly this spring that it was thought advisable to plough them up ; consequently, only *Bromus inermis* is left to report on.

This variety gave a fair crop the past season notwithstanding the amount of dry weather it had to contend against. Getting an early start in the spring, the crop was assured before the drought set in.

Bromus inermis has been principally sown on fallow-land without grain, but it has also been sown on stubble land, with and without grain. It has, so far however, done much better when sown alone.

A grain crop requires so much moisture, that the young grass plants suffer during August or whenever the wet season is over. On this account it is recommended that it be sown alone on fallowed-land or on stubble that has been well ploughed and harrowed.

Fifteen pounds per acre is sufficient to sow as it thickens up the second year.

After allowing the *Bromus* to ripen its seed the yield per acre, when cut, was found to be 2 tons 100 lbs.

The following grasses were sown last spring :—

Bromus inermis, on stubble, alone, May 10.

“ ganged in on stubble, alone, May 12.

Bromus inermis and Alsike, sown together on deep ploughing of oat stubble, May 26.

FODDER-MIXTURES AND FODDER-PLANTS.

The result of growing fodder the past season was not very satisfactory as far as quantity of production was concerned, but the quality was much better than it has been for several years.

Four mixtures of grain and one variety alone were sown for fodder purposes.

The mixtures containing pease were not benefited by that grain, as at best they were only a few inches high when cut. The best results in yield and quality were given by a mixture of rye and oats.

Hungarian grass and four kinds of millet were sown on spring-ploughing. All were long in germinating, and when rains came, the season was so far advanced that the yields were small in every case.

In the following table will be found results of tests :—

FODDER-MIXTURES.

Names of Grain.		Sown.	Cut for Hay.	Weight per acre Green.		Weight per acre Dry.	
Grain.	Variety.			Tons.	Lbs.	Tons.	Lbs.
1 { Pease Barley Oats One bushel of each per acre.	Golden Vine... Prize Prolific. Banner.....	May 4..	July 10..	2	150	1	350
2 { Pease Wheat Oats One bushel of each per acre.	Golden Vine.. Red Fife..... Banner.....	May 4..	July 10..	2	50	1	300
3 { Rye Oats Barley One bushel of each per acre.	Spring..... Welcome..... California Prolific.....	May 4..	July 10..	2	900	1	770
4 { Rye Oats One bushel of each per acre.	Spring..... Welcome.....	May 4..	July 10..	2	1100	1	890
5 Rye	Spring.....	May 4..	July 10..	1	1850	1	190

CORN.

Corn was planted for fodder purposes and, although a very small crop, was much better in quality than usual and will, no doubt, give good satisfaction as ensilage. The test of varieties was on clay loam.

INDIAN CORN—TEST OF VARIETIES.

Name of Variety.	Size of Plot.	Date of Sowing.	Character of Growth.	Height.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per Acre grown in Rows.	Weight per Acre grown in Hills.
				In.						Tons. Lbs.	Tons. Lbs.
Pearce's Prolific.....	$\frac{1}{30}$ acre	May 29	Str'ng	30	July 26	Aug. 3	Aug. 9	Aug. 18	Roasting .	4 1720	2 1400
Thorobred White Flint.	"	" 29	"	26	Aug. 15	" 25	" 31	.....	Early milk	4 760	2 320
North Dakota.....	"	" 29	Fair ..	32	July 31	Aug. 9	Aug. 15	Aug. 24	Late milk.	3 1681	2 1640
Smut-nose	"	" 29	"	36	" 26	" 3	" 9	" 18	"	3 1200	1 880
Angel of Midnight	"	" 29	"	35	" 20	July 28	" 5	" 14	Roasting .	3 960	1 840
Mitchell's Extra Early..	"	" 29	"	18	" 15	" 23	July 28	" 5	Glazed ...	3 486	1 1600
Gold Medal.....	"	" 29	"	36	Aug. 20	" 28	Sept. 3	.....	Early milk	3 —	4 400
Longfellow.....	"	" 29	Weak	33	July 30	" 7	Aug. 13	Aug. 22	Late milk.	2 920	1 1960

FIELD PLOTS.

Corn sown on summer-fallow	3 acres	May 29	Str'ng	48	.....	.....	.....	.....	Early milk	4 200	
Corn sown on stubble ..	"	" 29	Fair ..	45	.....	.....	.....	.....	"	3 1900	

BROOM CORN.

Improved Dwarf.....	$\frac{1}{30}$ acre	May 29	Weak	..	.....	.....	.....	.....	.....	1920	
Longbrush Evergreen...	"	" 29	"	..	.....	.....	.....	.....	.....	1683	
California Golden Long Brush.....	"	" 29	"	..	.....	.....	.....	.....	.....	1560	

HORSE-BEANS.

Sown in drills were poor in quality and quantity and were cut up and put in silo at same time as corn.

SUNFLOWERS.

Sunflowers were also sown for the silo. They were a fair crop but as they became ripe the black-birds devoured the seeds and a large portion of the field was lost in this way. The sunflowers were sown on April 25th on potato land, headed out on July 15th and was ripe on August 1st.

RAPE.

Several acres of rape were sown on June 14th, but on account of dry weather the crop was short. It, however, afforded a considerable quantity of green fodder during October when all other green feed was gone.

By turning the cattle on the rape after milking, no bad flavour was imparted to the milk.

ROOTS.

Turnips, mangels and carrots were a poor crop the past season. For weeks after they were sown the seeds did not germinate but lay dormant until rains came in July, then made very little growth until after the middle of September.

TURNIPS.

Thirteen sorts of turnips were sown for test on 28th May, and again on 9th June. The last sown came up first and gave the best yield.

The same sorts and two others were sown on May 29th in field lots, and, as they germinated before either of the test plots, they gave considerably the largest returns.

All were sown on fallowed land which had been ploughed, harrowed and rolled before seeding. Seed was sown in drills.

Following are results of tests both of small plots and field plots. The small plots occupied $\frac{1}{30}$ of an acre each, the field plots $\frac{1}{5}$ of an acre each, and the soil in all cases was clay loam.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	1st Plot Sown.		2nd Plot Sown.		1st Plot Pulled.		2nd Plot Pulled.		Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
										Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Westbury's Improved.....	Weak	May	28	June	9	Oct.	13.	Oct.	13.	10	640	344		10	1480	358	
Simmer's Champion.....	"	"	28	"	9	"	13.	"	13.	10	520	342		8	1400	290	
Giant King Swede.....	"	"	28	"	9	"	13.	"	13.	8	1160	286		10	400	340	
Rennie's Prize Purple Top.....	"	"	28	"	9	"	13.	"	13.	8	800	280		10	640	344	
Snow-white Globe.....	"	"	28	"	9	"	13.	"	13.	8	800	280		10	880	348	
Bloomsdale Swede.....	"	"	28	"	9	"	13.	"	13.	8	440	274		9	1800	330	
Marquis of Lorne.....	"	"	28	"	9	"	13.	"	13.	7	1600	260		8	200	270	
Purple Top—Steele.....	"	"	28	"	9	"	13.	"	13.	7	1600	260		8	80	268	
Jumbo or Monarch.....	"	"	28	"	9	"	13.	"	13.	7	1360	256		9	1200	320	
Carter's Elephant.....	"	"	28	"	9	"	13.	"	13.	7	1120	252		9	480	308	
Seed Grown on Ex. Farm, 1893	"	"	28	"	9	"	13.	"	13.	7	760	246		9	1200	320	
East Lothian.....	"	"	28	"	9	"	13.	"	13.	7	640	244		10	1600	360	
Skirving's Selected Swede.....	"	"	28	"	9	"	13.	"	13.	6	1920	232		8	1640	294	
Average.....													256 50				319 14

TURNIPS—FIELD-PLOTS.

Name of Variety.	Character of Growth.	Sown.	Pulled.	Yield per Acre.		Yield per Acre.	
				Tons.	Lbs.	Bush.	Lbs.
Giant King or Elephant.....	Fair	May 29...	Oct. 12...	19	880		648
Rennie's Prize Purple Top.....	"	" 29...	" 12...	18	480		608
Jumbo or Monarch.....	"	" 29...	" 12...	17	380		573
Westbury's Improved	"	" 29...	" 12...	16	1600		560
Marquis of Lorne.....	"	" 29...	" 12...	16	1120		552
Seed grown on Experimental Farm, 1893..	"	" 28...	" 12...	15	1680		528
Snow-white Globe.....	"	" 29...	" 12...	14	1040		484
Purple Top—Steele.....	"	" 29...	" 12...	14	920		482
Skirving's Selected Swede.....	"	" 29...	" 12...	14	200		470
Carter's Elephant.....	"	" 29...	" 12...	13	1840		464
Purple Top	"	" 29...	" 12...	13	1600		460
Simmer's Champion.....	"	" 29...	" 12...	12	1200		420
Bloomsdale Swede	"	" 29...	" 12...	12	400		420
East Lothian.....	"	" 29...	" 12...	12			400
Sutton's Champion.....	Weak	" 29...	" 12...	11	800		380
Average.....							496 36

NOTE.—The field on which the above varieties were sown in field plots was well sheltered by a maple plantation, which allowed the ground to retain the moisture, thereby causing the seed to germinate more quickly ; hence the increase in yield over the same varieties in the uniform-test plots, which were sown on more exposed grounds, showing the advantage of shelter screens of forest trees.

MANGELS—TEST OF VARIETIES.

Nine varieties of mangels were tested; they were sown on clay loam, on plots of $\frac{1}{30}$ acre each, on May 29, and again on June 9. Seven of the nine kinds were also sown on clay loam, in larger plots of $\frac{1}{5}$ acre each, on May 29, and on account of shelter afforded the field by a maple plantation, which made germination of the seed much earlier, the yields per acre were considerably higher than in the test plots:—

Name of variety.	Character of Growth.	1st Plot		2nd Plot		Yield per Acre.		Yield per Acre.		Yield per Acre.	
		Sown.		Sown.		Pulled.		Pulled.		Pulled.	
		1st Plot.	2nd Plot.	1st Plot.	2nd Plot.	1st Plot.	2nd Plot.	1st Plot.	2nd Plot.	1st Plot.	2nd Plot.
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.
Mammoth Long Red . . .	Weak	May 29	June 9	Sept. 17	Sept. 17	9 1800	330			9 600	310
Pearce's Canadian Giant...	"	" 29	" 9	" 17	" 17	9 1320	322	10 1000	350		
Mammoth Long Red	"	" 29	" 9	" 17	" 17	8 1400	290	6 1200	220		
Mam. Long Red—Evans ..	"	" 29	" 9	" 17	" 17	8 1400	290	9 960	316		
Gate Post.....	"	" 29	" 9	" 17	" 17	8 200	270	9 1800	330		
Giant Yellow Intermediate	"	" 29	" 9	" 17	" 17	8 80	268	8 1760	296		
Golden Tankard	"	" 29	" 9	" 17	" 17	7 160	236	7 1600	260		
Imp. Mammoth Long Red.	"	" 29	" 9	" 17	" 17	6 1920	232	9	300		
Carter's Warden or Orange	"	" 29	" 9	" 17	" 17	6 840	214	7 400	240		
Globe.....	"	" 29	" 9	" 17	" 17						
Average.....							272 26				291 20

FIELD LOTS.

Mammoth Long Red . . .	Weak	May 29	Sept. 15	10 1840	364		
Gate Post.....	"	" 29	" 15	10 400	340		
Gate Post and Yellow Tan-	"	" 29	" 15	9 1440	324		
kard (mixed).....	"	" 29	" 15	9 1200	320		
Pearce's Canadian Giant...	"	" 29	" 15	9 600	310		
Carter's Warden.....	"	" 29	" 15	9	300		
Giant Yellow Intermediate	"	" 29	" 15	8 1880	298		
Golden Tankard	"	" 29	" 15				
Average.....					322 17		

CARROTS.

Twelve varieties were sown on clay loam on plots of $\frac{1}{30}$ acre each, the crop in each case was very light.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	Sown.	Pulled.	Yield per Acre.		Yield per Acre.
				Tons.	Lbs.	Bush.
Giant White Vosges.....	Very weak....	May 17..	Oct. 13..	4	1,840	164
Improved Long White	"	" 17..	" 13..	4	1,360	156
Iverson's Champion.....	"	" 17..	" 13..	4	1,100	152
Improved Short White.....	"	" 17..	" 13..	4	880	148
White Belgian.....	"	" 17..	" 13..	3	1,920	132
Mammoth White Intermediate	"	" 17..	" 13..	3	960	116
Carter's Orange Giant.....	"	" 17..	" 13..	3	240	104
Guerande.....	"	" 17..	" 13..	3	160	136
Early Gem.....	"	" 17..	" 13..	3		100
Half Long White.....	"	" 17..	" 13..	2	1,280	88
Half Long Stump-rooted	"	" 17..	" 13..	2	1,040	84
St. Valery.....	"	" 17..	" 13..	2	1,040	84
Average						122

SUGAR BEETS.

Three varieties of sugar beets were sown, with the following results:—

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	Character of Soil.	Size of Plot.	Character of Growth.	Sown.	Pulled.	Yield per Acre.		Yield per Acre.
						Tons.	Lbs.	Bush.
French Red Top.....	Clay loam.	$\frac{1}{30}$ acre..	Weak	May 28..	Sept. 17..	8	800	246
Klein Wanzleben.....	" ..	" ..	"	" 28..	" 17..	7	1,600	280
Vilmorin's Improved	" ..	" ..	"	" 28..	" 17..	7	760	260
Average.....	.....	.....	.....	.....	.....	.....	.....	262

POTATOES.

Fifty-seven varieties of potatoes were planted the past season ; thirty-five of which were chosen for uniform test, on all the Experimental Farms. The varieties enumerated under No. 2 were additional sorts which it was thought desirable to test at Indian Head ; they were all planted on plots of $\frac{1}{50}$ acre each, soil clay loam. The season was so unfavourable that no just estimate can be made as to the best sorts for the North-West Territories.

In the uniform test the fourteen varieties first mentioned in the tables were the earliest in maturing, closely followed by the next eleven, the remainder of the varieties being late. As will be seen, none of the early sorts yielded well and very few of them were of large size, but all were of excellent quality. Among the varieties under test No. 2, there were six early sorts, four of which were good in size and yield, and all were of good quality.

TEST OF VARIETIES—NO. 1.

Name of Variety.	Planted.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre.	Yield per Acre of Sound.	Yield per Acre of Marketable.	Yield per Acre of Unmarketable.	Form and Colour.
(Early.)			Sept. 15			Bush.	Bush.	Bush.	Bush.	
Crown Jewel.....	May 19	Fair ..	to 25.	Medium	Watery.....	248	248	236	12	Lg., pink & wh.
Algoma No. 1.....	" 19	" ..	"	"	Mealy, good.	240	240	230	10	Round, pink.
Lee's Favourite.....	" 19	" ..	"	"	Dry, good..	234	234	230	4	Lg., pink & wh.
Early Gem.....	" 19	" ..	"	Small...	Mealy, good.	232	232	202	30	Long, pink.
Wonder of the World.	" 19	" ..	"	" ..	Dry, good ..	204	204	164	40	Round, pink.
Daisy.....	" 19	" ..	"	Large ..	" ..	180	180	163	12	" "
Seedling No. 214.....	" 19	" ..	"	" ..	Wet	148	148	136	12	" white.
Sharpe's Seedling....	" 19	" ..	"	Medium	Mealy	142	142	132	10	Lg., pink & wh.
Early Ohio.....	" 19	Weak..	"	"	Dry, good..	128	128	120	8	Round, pink.
Early Rose.....	" 19	" ..	"	"	Mealy.....	124	124	120	4	Long, pink.
Thorburn.....	" 19	" ..	"	Small ..	Watery.....	100	100	65	35	Round, white.
Burpee's Extra Early.	" 19	" ..	"	Medium	Mealy.....	100	100	85	15	" red.
Pearce's Extra Early.	" 19	" ..	"	"	"	80	80	74	6	" pink.
Early Puritan.....	" 19	" ..	"	"	"	80	80	76	4	Long, white.

POTATOES—UNIFORM TEST—Continued.

Name of Variety.	Planted.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre.	Yield per Acre of Sound.	Yield per Acre of Marketable.	Yield per Acre of Unmarketable.	Form and Colour.
(Medium.)										
			Sept. 26			Bush.	Bush.	Bush.	Bush.	
Clarke's No. 1.....	May 19	Fair...	to Oct. 1.	Large ..	Mealy, good.	220	220	216	4	Lg., wh & pink.
Northern Spy.....	" 19	" ..	"	Medium	Dry, good...	206	206	200	6	Long, red.
Early Sunrise.....	" 19	" ..	"	Small...	" ..	180	180	140	40	" pink.
Chicago Market.....	" 19	" ..	"	Medium	Mealy, good.	180	180	170	10	" ..
Harbinger.....	" 19	" ..	"	Small...	" ..	160	160	120	40	" ..
Polaris.....	" 19	" ..	"	" ..	Good.....	156	156	100	56	" white.
Everett.....	" 19	" ..	"	" ..	Wet.....	148	148	103	45	" pink.
Vanier.....	" 19	Weak .	"	Medium	.....	126	126	110	16	" ..
World's Fair.....	" 19	" ..	"	"	Wet, poor...	100	100	92	8	Round, pink.
Lizzie's Pride.....	" 19	" ..	"	"	Wet.....	92	92	90	2	Long, white.
Empire State.....	" 19	" ..	"	"	Dry, good...	90	90	85	5	" ..
(Late.)										
			Oct. 2							
State of Maine.....	May 19	Fair...	to 10.	Large ..	Mealy... ..	242	242	234	8	Round, white
Late Puritan.....	" 19	" ..	"	Small...	" ..	212	212	199	13	Long, ..
London.....	" 19	" ..	"	Medium	Medium....	180	180	172	8	" red.
I. X. L.....	" 19	" ..	"	"	.....	180	180	172	8	" white.
American Wonder...	" 19	" ..	"	"	Wet.....	172	172	162	10	Round, pink.
Rural Blush.....	" 19	" ..	"	"	Mealy.....	166	166	160	6	" red.
Pearce's Prize Winner	" 19	" ..	"	"	Wet, poor...	146	146	140	6	Long, pink
Dakota Red.....	" 19	" ..	"	Large...	Mealy.....	118	118	100	18	Round, red.
White Beauty.....	" 19	Weak .	"	Medium	Wet, poor...	110	110	100	10	Long, white.
Holborn Abundance...	" 19	" ..	"	Small...	" ..	76	76	10	66	Round, ..

TEST OF VARIETIES—NO. 2.

Toronto Queen... ..	May 19	Fair...	Sept. 20							
Clarke's Extra Early.	" 19	" ..	to 25.	Medium	Mealy.....	270	270	250	20	Round, pink.
Algoma.....	" 19	" ..	"	"	" ..	200	200	187	13	Lg., pink & wh.
Morning Star.....	" 19	" ..	"	Large ..	" ..	166	166	160	6	Round, pink.
Vanguard.....	" 19	Weak .	"	Medium	" ..	150	150	120	30	Long, white.
Ashleaf Kidney.....	" 19	" ..	"	"	Wet.....	76	76	70	6	" red.
				Small ..	Mealy.....	72	72	10	62	" white.
(Medium.)										
			Sept. 26							
Beauty of Hebron...	May 19	Fair...	to Oct. 1	Medium	Mealy.....	240	240	219	21	Lg., pink & wh.
Early Summer.	" 19	" ..	"	Small ..	Mealy, good.	186	186	180	6	Long, pink.
Pride of Table, White	" 19	" ..	"	Medium	Wet.. ..	180	180	155	25	" white.
Pride of Table, Red..	" 19	" ..	"	Large ..	Mealy, good.	120	120	115	5	" red.
White Elephant.....	" 19	Weak .	"	Medium	Wet, poor..	112	112	100	12	" pink & wh.
Early Northern	" 19	" ..	"	"	Mealy, good.	100	100	96	4	" red.
Clarke's Triumph	" 19	" ..	"	"	Mealy.....	94	94	90	4	" pink & wh.
Freeman.....	" 19	" ..	"	"	" ..	92	92	90	2	" white.
Dreer's Standard.....	" 19	" ..	"	"	Medium....	60	60	55	5	" ..
(Late.)										
			Oct. 2 to							
American Giant.....	May 19	Fair...	10.	Medium	Mealy.....	240	240	220	20	Long, white.
Green Mountain.....	" 19	" ..	"	"	Wet.....	216	216	200	16	Round ..
Assiniboia.....	" 19	" ..	"	"	" ..	190	190	180	10	Long ..
Sunlit Star.....	" 19	" ..	"	"	Mealy.	180	180	160	20	" pink.
Munroe County.....	" 19	Weak .	"	"	Poor.....	88	88	60	28	Round, pink.
Magnum Bonum.....	" 19	" ..	"	V. small	Wet, poor ..	60	60	....	60	" white.
Sharpe's Queen	" 19	" ..	"	Medium	Poor.....	48	48	....	48	" ..

VEGETABLE GARDEN.

Like all other crops on the farm, the vegetables suffered from the very dry, hot weather. A few sorts that it was possible to irrigate, gave splendid results, such as celery, cucumbers, melons and tomatoes, but where irrigation was impossible, a very light crop was the result.

ARTICHOKES.

These made very poor growth. Only a few small tubers were to be found. They stand the winter well.

ASPARAGUS.

Conover's Colossal, old bed, fit for use on May 20 ; splendid crop.
50 Early Argenteuil, new variety, planted May 10, doing well.
50 Mam. Wh. Columbus " " "
50 Barr's Mammoth " " "
50 Donald's Elmira, from C. E. F. " "
50 Conover's Colossal " " "
Plants grown from seeds, Exp. Farm, Indian Head, planted May 10, doing well.
Seed, 5 rows, Exp. Farm, Indian Head, sown May 15, doing well.

BEANS.

Eight varieties were planted ; all were very poor, the season being too dry when they were filling ; as string beans they were hardly fit for use.

TEST OF VARIETIES.

Name of Variety.	Planted.		Up.		Fit for use.		Pulled.	
Burpee's Stringless Green Pod.....	May	16....	May	31....	July	15....	August	10
Thorburn's Extra Early Refugee.....	"	16....	"	31....	"	15....	"	10
Emperor William.....	"	16....	"	31....	Aug.	1....	"	15
Wardell's Kidney Wax.....	"	16....	"	31....	July	20....	"	10
Crystal Wax.....	"	16....	"	31....	"	20....	"	10
Dwarf German White Wax	"	16....	"	31....	"	20....	"	10
Yellow Six-weeks	"	16....	"	31....	"	15....	"	10
Dwarf Mohawk.....	"	16....	"	31....	"	15....	"	10

BEETS.

Eight varieties were sown ; all were of good quality except Crosby's Improved Egyptian and Black Queen.

TEST OF VARIETIES.

Name of Variety.	Sown.		Up.		Fit for use		Pulled.	Bush. per acre.	Remarks.	
Lentz	May	11..	May	24..	July	20..	Sept.	19..	726	The best ; quality, extra.
Edmund's Early	"	11..	"	24..	"	20..	"	19..	484	Quality, good ; shape, extra.
Columbia.....	"	11..	"	24..	"	20..	"	19..	363	" extra.
Crosby's Imp. Egyptian.	"	11..	"	24..	"	26..	"	19..	437	" poor ; shape, good.
New Victoria.	"	11..	"	24..	Aug.	10..	"	19..	437	" extra ; half long.
Arlington Favourite ...	"	11..	"	24..	July	20..	"	19..	437	" good.
Rennie's Intermediate...	"	11..	"	24..	Aug.	10..	"	19..	484	" good ; half long.
Black Queen.....	"	11..	"	24..	July	20..	"	19..	283	Very poor.

CAULIFLOWERS.

Of the nine varieties tested, all did well with the exception of Stadtholder, none of which were cut.

Name of Variety.	Sown in Hot Bed.	Up.	Transplanted in Hot Bed.	Transplanted into Garden.	Fit for use.	Fit for use.	Duration of fit- ness for use.	Remarks.
					From	Till		
Early Favourite	Mar. 28	Apr. 3	April 29	May 31	July 13	Aug. 13	1 mo.	Good. Well headed.
Giant White Pearl.....	" 28	" 3	" 29	" 31	" 11	" 26	1½ mo.	Best this season.
Early Snowball.....	" 28	" 3	" 29	" 31	" 11	" 1	20dys.	Very good but small.
Extra Early White-head.	" 28	" 3	" 29	" 31	" 7	Sept. 15	2¼ mo.	" "
Veitch's Autumn Giant..	" 28	" 3	" 29	" 31	Sept. 1	Oct. 1	1 mo.	Very large. Did not head well.
L'rge Early Dwarf Erfurt	" 28	" 3	" 29	" 31	" 1	" 1	"	" "
Autumn Giant.....	" 28	" 3	" 29	" 31	July 18	Aug. 18	"	Fair, some good heads. Not regular.
Gilt Edge.....	" 28	" 3	" 29	" 31	" 7	Sept. 15	2¼ mo.	Very fine heads but small.
Stadtholder	" 28	" 3	" 29	" 31	Aug. 1	.....	.....	No good. None cut.

CABBAGE.

Sixteen varieties were tested. All early kinds did well, but late sorts were a poor crop on account of dry weather.

Name of Variety.	Sown in Hot Bed.	Transplanted in Hot Bed	Transplanted into Garden	Fit for use.	Taken up.	Remarks.
Chester King.....	Mar. 29	Apr. 28	May 30	Oct. 1	Oct. 15	Late, strong growing, heads small but hard.
Drumhead Savoy	" 29	" 28	" 30	" 1	" 15	Late, made fair heads.
Marblehead Mammoth	" 29	" 28	" 30	Sept. 5	" 15	Did not grow to any size.
World Beater.....	" 29	" 28	" 30	" 5	" 15	Good. Even sized heads, all headed up.
Vandergraw.....	" 29	" 28	" 30	Aug. 20	" 15	Early; very good; every plant headed.
Succession.....	" 29	" 28	" 30	" 15	" 15	" "
Early Summer.....	" 29	" 28	" 30	" 15	" 15	" "
Bridgeport Drumhead.	" 29	" 28	" 30	Sept. 15	" 15	Late. Poor. Not more than ½ headed.
Autumn King.....	Apr. 10	" 28	" 30	" 15	" 15	Late. Poor. Seed did not come up well.
Late Drumhead.....	" 10	" 28	" 30	" 15	" 15	Very poor.
Mammoth Red Rock..	Mar. 29	" 28	" 30	" 15	" 15	Fair, about ¾ plants headed well but small.
Imp. Jersey Wakefield	" 29	" 28	" 30	Aug. 1	" 15	Early. Good. Every plant headed well.
Matchless Flat-dutch..	" 29	" 28	" 30	Sept. 1	" 15	Late. Did not head well.
Burpee's all head.....	Apr. 10	" 28	" 30	Aug. 20	" 15	Best cabbage this year. Every plant headed well.
Lauderbach's All the	" 10	" 28	" 30	" 20	" 15	Fair. About ½ made good heads.
Year Round.....	" 11	" 28	" 30	Sept. 1	" 15	The best Savoy. All headed well.
Savoy Vertus.....						

CUCUMBERS—TEST OF 7 VARIETIES—SOWN IN HOT-BED AND TRANSPLANTED INTO FRAME.

Name of Variety.	Sown in Hot Bed.	Transplanted to Frame.	Fit for use.	Fit for use.	Duration of fitness for use.	Remarks.
	Date.	Date.	From	Till	Months.	
Burpee's White Pearl. . . .	Apr. 19.	May 21.	July 5.	Aug. 20.	1½	Very fine but small. Cut all season.
Siberian	" 19.	" 21.	" 5.	" 20.	1½	Very fine but small. Cut greatest number.
Cool and Crisp.	" 19.	" 21.	" 10.	" 20.	1½	Very good, fair size.
White Spine.	" 19.	" 21.	" 10.	" 20.	1½	Very good. Large well shaped.
Giant Pera.	" 19.	" 21.	" 10.	" 20.	1½	The best. Very large. Heavy crop all season.
<i>Sown in open—No Protection.</i>	Sown.					
Burpee's White Pearl. . . .	May 26.	.....	Aug. 1.	Frozen.	.....	A few good cucumbers. Fair crop.
White Spine.	" 26.	.....	" 1.	" ..	.....	Good crop of picklers.
New Paris Pickling.	" 26.	.....	" 1.	" ..	.....	Large crop. One of the best for pickling.
New Siberian	" 26.	.. ..	July 20.	" ..	.....	Very good. None large enough except for pickling.

CELERY—TEST OF 8 VARIETIES

Name of Variety.	Sown in Hot Bed.	Transplanted in Hot Bed.	Transplanted into Garden.	Fit for use.	Lifted.	Remarks.
DeCandolle.	Mar. 26.	May 15.	June 22.	Aug. 20.	Oct. 11.	Long and white; upright and close.
Rennie's Giant White	" 26.	" 15.	" 22.	" 20.	" 20.	Very large; white; not very solid.
White Plume	" 26.	" 20.	" 22.	" 20.	" 20.	Seed not true; only 1 dozen White Plume.
Giant Golden Heart.	" 26.	" 20.	" 22.	" 20.	" 20.	Very large. Similar to Giant White.
Evan's New Triumph.	" 27.	June 4.	" 23.	" 20.	" 20.	Very fine. Large and white.
Henderson's Golden Dwarf	" 31.	" 4.	" 23.	" 20.	" 20.	Extra good. Large, solid and well blanched.
Paris Golden Yellow.	" 31.	" 4.	" 23.	" 20.	" 20.	Good. White and solid.
Perle Le Grand.	" 31.	" 4.	" 23.	" 20.	" 20.	Very good. White and solid.

CARROTS.

Name of Variety.	Sown.	Up.	Fit for use.	Lifted.	Bush. per acre.	Quality.
Early Scarlet Short Horn..	April 23....	May 15....	July 2....	Oct. 1....	202	Good.
Early Very Short.	" 23....	" 15....	" 2....	" 1....	162	"
French Forcing	" 23....	" 15....	" 2....	" 1....	202	"
Half-long Scarlet Nantes..	" 23....	" 15....	" 2....	" 1....	242	Very good.
Danver's Half-long	" 23....	" 15....	" 2....	" 1....	242	"
Red Carenton	" 23....	" 15....	" 2....	" 1....	242	"

CORN.

Name of Variety.	Sown.		Up.		Fit for use.		Ripe.	Remarks.
Early Vermont.....	May	16....	June	2....	July	25....	Aug. 15 ..	Good crop.
Dreer's First of all.....	"	16....	"	2....	"	25....	" 15....	"
Early Cory ..	"	16....	"	2....	"	25....	" 15....	"
Squaw.....	"	16....	"	2....	"	15....	" 1....	"

NOTE—By wrapping a few of the ears in paper they were saved for seed. The remainder were destroyed by black birds.

CITRONS.

Name of Variety.	Sown in hot b d.	Trans- planted into Frame.	Fit for use.	Remarks.
<i>Grown in frames.</i>				
Colorado Preserving...	April 19....	May 21....	Aug. 10....	Grew very large; one plant in frame gave six long-shaped fruits, one weighing over 20 lbs., and the smallest, 10 lbs. The other two plants produced round fruit averaging 10 lbs. each, the largest weighing 16 lbs.
Common Citron.....	" 19....	" 21....	" 10..	A large crop of fruit. One citron weighed 16 lbs, and crop averaged about 8 lbs.
<i>Seed sown in open.</i>				
Colorado Preserving...	May 26 ....	.....	Aug. 20....	Much smaller than those grown in frames, but the same type, and all fit for use.
Common Citron... ..	" 26 ....	.....	" 20....	Smaller than those grown in frames, but all fit for use.

LETTUCE.

Name of Variety.	Sown in Hot- Bed.		Transplant- ed in Hot Bed.		Fit for use.		Remarks.
<i>Sown in Frame.</i>							
Toronto Gem.....	March	29..	April	20..	May	20..	Made large, loose heads, very good.
Garden Queen.....	"	29..	"	20..	"	20..	Made compact heads. Best variety for forcing.
All Head.....	"	29..	"	20..	"	20..	Did not do well in frames.
<i>Sown in Garden.</i>							
	<i>Sown.</i>		<i>Up.</i>		<i>Fit for Use.</i>		
All Heart.....	April	25..	May	9..	June	1..	Very good, large heads, fairly solid.
New Cos.....	"	25..	"	9..	"	20..	Did not do well this season.
White Paris Cos.....	"	25..	"	9..	"	20..	Did not do well this season.
Toronto Gem.....	"	25..	"	9..	"	1..	Very good.
New Sensation.....	"	25..	"	9..	"	1..	Very good, stood dry weather best.
Golden Queen.....	"	25..	"	9..	"	15..	Made good heads, but soon dried up.
California Cream Butter.	"	25..	"	9..	"	15..	Made very large heads, quality not good.

MELONS—MUSK.

Name of Variety.	Sown in Hot-Bed.		Transplant- ed to Garden.		Ripe.	Remarks.
<i>Grown in Frame.</i>						
Emerald Gem.....	April	18..	May	21..	August 18..	Fit for use till frost came. Three plants produced 10 melons, averaging 1 pound each. All ripened but four. Quality, extra fine; red flesh.
Evan's Superb.....	"	19..	"	21	" 30..	Fit for use till frost came. Three plants gave 8 melons, all ripened but two. Average, 4 lbs. Quality, extra good, green flesh.
Montreal Market.....	"	19..	"	21..	" 28..	Three plants produced 8 melons, all ripened but two. Average, 3 lbs. Quality, extra fine, green flesh.
<i>Sown & Grown in Open.</i>		<i>Sown.</i>				
Emerald Gem.....	May	26..	.....		.....	Formed a lot of fine fruit which never ripened enough for use. One plant produced six long-shaped melons that were ripe enough to bring seed to maturity but flavour was not good.

MELONS—WATER.

Phinney's Early. Sown in hot-bed April 19th. Transplanted May 21. Ripe Aug. 18.
Two plants gave six melons of very good quality. All ripened. Weight, 6 lbs. each.

MELONS—MANGO.

Sown May 26 (in open grounds). Ripe August 15.
Produced a large crop of fruit about the size of an orange.

LEMON—GARDEN.

Sown May 26, (in open ground). Ripe August 15.
Gave a large crop of fruit about the size of a lemon.

ONIONS.

Transplanted.	Sown in Hot-Bed.	Up.	Trans- planted to Garden.	Fit' for use.	Lifted.	Bushels per acre.
<i>Name of Variety.</i>						
Prize Taker.....	March 27.	April 10..	June 13...	Aug. 15..	Sept. 12..	388
Red Victoria.....	" 27	" 20..	" 13...	" 15..	" 12..	291
Southport White Globe.....	" 27.	" 10..	" 13...	" 15..	" 12..	194
Giant Rocca.....	" 27.	" 10	" 13...	" 15..	" 12..	436
Large Blood Red Wethersfield.....	" 27.	" 10..	" 13...	" 15..	" 12..	194
Oregon Long Keeper.....	" 27.	" 10..	" 13...	" 15..	" 12..	194
Red Globe.....	" 27.	" 10..	" 13...	" 15..	" 12..	194
Yellow Danvers.....	" 27.	" 10..	" 13...	" 15..	" 12..	145
World Beater Wethersfield.....	April 10..	" 20	" 13...	" 15..	" 12..	121
King of the Earlies.....	" 10..	" 20..	" 13...	" 10..	" 12..	60½
Fancy Yellow Danvers.....	" 10..	" 20..	" 13...	" 20..	" 22..	145

ONIONS.

Sown in open.	Sown.	Up.	Fit for use.	Lifted.	Bushels per acre.
Name of Variety.					
New Queen.....	April 10..	May 15..	Aug. 25..	Aug. 25..	.....
Small Silver Skin.....	" 10..	" 15..	" 25..	" 25..	.....
Oregon Long Keeper.....	" 10..	" 15..	" 25..	Sept. 12..	242
Giant Prize Taker.....	" 20..	" 15..	" 25..	" 12..	291
Southport White Globe.....	" 20..	" 15..	" 25..	" 12..	194
Large Blood Red Wethersfield	" 20..	" 15..	" 25..	" 12..	194
Large Red Globe.....	" 20..	" 15..	" 25..	" 12..	194
Fancy Yellow Danvers.....	" 20..	" 15..	" 25..	" 12..	266
World Beater Wethersfield.....	" 20..	" 15..	" 25..	" 12..	194
King of the Earlies.....	" 20..	" 15..	" 25..	" 12..	194
Large Yellow Danvers.....	" 20..	" 15..	" 25..	" 12..	194

NOTE.—About a dozen each of the best onions saved from last year, Prize Taker, Early Red, Red Globe and Yellow Danvers, were planted out for seed, and the result is a fine lot of well ripened seed.

PARSNIPS.

Name of Variety.	Sown.	Up.	Lifted.	Remarks.
Hollow Crown.....	April 25..	May 15..	Oct. 15..	Very poor.
Maltese.....	" 25..	None came up.		No good.

PARSLEY.

Name of Variety.	Sown.	Up.	Fit for use.	Remarks.
Moss Curled.....	April 25..	May 25..	July 1..	Extra good.
Triple Curled.....	June 4..	June 24..	Aug. 1..	Good. Too late sown.
Double Curled.....	" 4..	" 24..	" 1..	" "

PEASE.

Name of Variety.	Sown.	Up.	Fit for use.	Pulled.	Remarks.
McLean's Little Gem..	April 25..	May 11..	July 1..	Green....	Very good early pea. Large yield.
American Wonder....	" 25..	" 11..	" 1..	"	Very good.
Yorkshire Hero.....	" 25..	" 11..	" 7..	"	Good yield green peas.
Stratagem ..	" 25..	" 11..	" 7..	"	Large pods, but not well filled.
Heroine.....	" 25..	" 11..	" 7..	"	Extra good.
Champion of England.	" 25..	" 11..	" 7..	"	Extra good pods. Large, well filled.

PEASE.

Pease—2nd Seeding.	Sown.		Up.		Fit for use.		Pulled.	
<i>Name of Variety.</i>								
New Queen	May	11....	May	23....	July	18....	Aug.	6
Early Star.....	"	11....	"	23....	"	18....	"	6
Yorkshire Hero.....	"	11....	"	23....	"	18....	"	6
Sunol.....	"	11....	"	23....	"	18....	July	18
Prince of Wales.....	"	11....	"	23....	"	18....	Aug.	1
American Wonder.....	"	11....	"	23....	"	18....	"	1
Juno.....	"	11....	"	23....	"	18....	"	6
Burpee's Profusion.....	"	11....	"	23....	"	18....	"	6
Horsford's Market Garden	"	11....	"	23....	"	18....	"	6
Pride of the Market.....	"	11....	"	23....	"	18....	"	6
Stratagem.....	"	11....	"	23....	"	18....	"	6
Heroine.....	"	11....	"	23....	"	18....	"	6

NOTE.—The pease sown in above test on May 11th were all well podded, but the dry weather affected the filling.

RADISHES.

Sown in hot-bed.	Sown.		Up.		Fit for use.		Remarks.
Scarlet Olive Shaped.....	Mar.	25..	April	2..	April	25..	Very good. Good for forcing.
Rosy Gem.....	"	25..	"	2..	"	25..	Extra good. " "
Scarlet Turnip White Tipped	"	25..	"	2..	"	25..	" " "
New Pearl Forcing.....	"	25..	"	2..	May	1..	No good for forcing.
Brightest and Best.....	"	25..	"	2..	"	1..	" " "
<i>Sown in Garden.</i>							
Rosy Gem.....	April	25..	May	9..	June	1..	Very good.
Brightest and Best.....	"	25..	"	9..	"	1..	" Long.
New Pearl Forcing.....	"	25..	"	9..	"	5..	Extra good.
Scarlet Olive Shaped.....	"	25..	"	9..	"	1..	Very good at first but soon became hollow.
<i>2nd Seeding in Garden.</i>							
Rosy Gem.....	June	2..					Did not do well on account of dry weather.
Brightest and Best.....	"	2..					" " "
New Pearl Forcing.....	"	2..					" " "
Scarlet Olive Shaped.....	"	2..					" " "

RHUBARB.

Stotts' Mammoth. Fit for use May 24.
 Victoria. " "
 Linnæus. " "
 Carleton Club. " "

Did not do well on account of dry weather.

Sowed seed in hot-bed on April 20. Transplanted 160 plants into nursery on June

8. All doing well.

SPINACH.

Bloomsdale—Sown April 25. Came up well, but ran to seed almost at once.

SUMMER SAVORY.

Sown April 25 ; up May 15 ; lifted August 1. Very good.

TOMATOES.

Name of Variety.	Sown in Hot Bed.	Transplanted in Hot Bed.	Transplanted into Garden.	In Fruit.	Ripe.	Remarks.
Early Ruby.....	March 28.	Apr. 27.	May 30.	June 12.	July 25.	Produced a good crop of large fruit.
Atlantic Prize.....	" 28.	" 27.	" 30.	" 10.	" 25.	Very good. Very even in size and shape.
Earliest of all.....	" 28.	" 27.	" 30.	" 12.	" 25.	Large crop. Not well shaped.
Everbearing.....	" 28.	" 27.	" 30.	" 12.	Aug. 1.	Large crop of small, not well flavoured fruit.
Dwarf Champion.. ..	" 28.	" 27.	" 30.	" 20.	" 5.	Nearly all fruit decayed.
Livingston's Aristocrat..	" 28.	" 27.	" 30.	" 20.	" 1.	" "
Red Cherry.....	" 28.	" 27.	" 30.	" 12.	July 16.	Extra good, heavy crop of small fruit.
<i>Seed sown in boxes in house.</i>						
Early Arctic.....	Feb. 7....	Apr. 16.	May 30.	June 5..	July 21.	Very good. Gave a large crop of fine fruit.
Yellow Plum.....	" 7....	" 16.	" 30.	" 10..	" 16.	Extra good. Very heavy crop.

FLOWER GARDEN.

Flowers suffered very much from the dry hot weather, and although a limited supply of water was at hand and applied freely, it was of very little use against the blazing sun and temperature of 95° to 100°.

Pansies were a poor show until early in the fall, and at this date, November 1, are blooming amid snow and frost better than at anytime before.

Asters made a fine display and continued in bloom for a considerable length of time.

Dianthus, Mignonette, Stocks and Verbenas did fairly well, but dry weather was much against them.

A large number of bulbs were received from the Central Experimental Farm in November, 1893, too late, on account of severe frosts, to plant outside. A few of the following :—Narcissus, Single and Double Hyacinths, Crocus and Scilla Sibirica were potted in November and kept in the house, and gave a fine show of flowers during February and March. The remainder of the bulbs were planted in the garden in the spring, but have not bloomed.

A list of the bulbs and all perennials and annuals is given below with date as to flowering and suitability to the North-west.

A fine lot of Bulbs have been received again this year, the majority of which were planted in the garden and the balance potted for house-flowering.

ANNUALS.

Asters. —Eight colours, Victoria ; five colours, Dwarf Bouquet ; four colours, Dwarf Pæony Flowered, were sown in hot-bed on April 3 ; transplanted in hot-bed on May 1, and into open-ground on June 13. All grew well and commenced to bloom about August 15, continuing in bloom till first severe frost. A large number were lifted into

pots and boxes before they were touched by frost, and being protected, made a very fine show in the house for a considerable length of time.

Antirrhinum.—Majus and minus were sown in hot-bed on April 20th and transplanted into open ground on June 14th. Both varieties did well; making a good show until first severe frost. No North-west flower garden should be without these.

Artemisia gracilis.—Foliage variegated, sown in hot-bed, April 19th; transplanted into garden, June 14th. Not more than one-third of the plants were variegated. Makes a fair border plant. Seed sown in open on June 1st did not come up.

Alyssum compactum.—Sown in garden on April 23th, for borders to beds. Came into bloom early in June and continued till hard frost. One of the best flowers we have for bordering beds.

Anagallis grandiflora.—Sown in hot-bed April 20 and transplanted into garden June 14th. A very showy free-blooming little plant. In bloom till frozen.

Abronia umbellata.—Sown in hot bed April 19th, transplanted into garden June 13th, did well and made a good show. A very good flower for this country.

Beta Brasiliensis.—Sown for a border to a bed in garden, but was found to be not suitable for bordering. Would make a much better soiling plant.

Clarkia elegans.—Sown in hot-bed on April 20th. Transplanted to garden June 20; made a good show for a few weeks but did not stand the dry weather. It is however well worth a place in any North-west garden.

Seed was sown in garden on May 12th, but it never came up.

Calandrinia grandiflora.—Sown in hot-bed on April 20th. Transplanted to garden June 13th. Very showy, fine foliage. Kept in bloom until first severe frost.

Commelina grandiflora.—A very pretty blue flower, but does not stand dry weather well, nor make much show.

Convolvulus minor.—Sown in garden on May 12. Made a good show all summer and stood dry weather well. Should be in every North-west flower-garden.

Chrysanthemum Dunetti.—Sown in garden May 12. Seed came up only fairly well, but the few plants flowered well up to first severe frost.

Cheiranthus maritimus.—Sown in hot-bed April 20. Transplanted into garden June 13. A nice little plant for borders. Sown in open on May 12, plants kept in flower longer than those sown in hot-bed and transplanted.

Dianthus Heddewigii and Chinensis.—Sown in hot-bed April 19. Transplanted to garden June 13. Both varieties did extra well and flowered the whole season.

Helichrysum monstrosum (Everlasting). Sown in hot-bed on April 20. Transplanted into garden June 13, made a fair show during August and September.

Eschscholtzia (California poppy).—Sown in garden on May 12. One of the best annuals for the North-west. Stands drouth and first frost, and blooms very freely.

Gaillardia picta.—Sown in hot-bed April 19. Transplanted to garden June 13. Came into bloom July 15, and continued until hard frost. One of the best flowers for the North-west Territories.

Helipterum.—Sown in hot-bed, April 20. Transplanted into garden June 13. A very pretty yellow everlasting. Flowered quite freely but not very showy. Flowers kept well for winter bouquets.

Helianthus annuus, pl. fl. (Double Sunflower).—Seed was sown in pots in hot-bed on April 19, and put out in garden on June 1. None of the plants gave double flowers but were very well branched and made a good show.

Iberis (Candytuft).—Sown in garden, April 23rd. Came up well but almost all the young plants were eaten off by the turnip beetle. The few plants that escaped flowered well all through the season.

Linum grandiflorum.—Rose and scarlet flax were sown in hot-bed on April 19th. Transplanted into garden June 13th. Both flowered well all through the summer, but the scarlet is the stronger grower and makes more show. They were also sown in garden on May 12th and did well.

Scarlet flax is one of the best flowers for the North-west.

Lupinus.—Mixed sown in pots in hot-bed on April 19th. Transplanted to garden June 14th. All the varieties bloomed fairly well, but, on account of the season being so dry, did not make large plants. Lupins are well worth a trial.

Mignonette.—Seed of *Spiralis*, *Splendens*, *Giganteum*, *Aurea*, *Victoria* and Common Mignonette was sown in garden on May 15th. All varieties did well. *Aurea* made the largest spikes of bloom, but the old Common is excelled by none in fragrance. One of the best flowers for a North-west garden.

Matricaria eximia.—Sown in hot-bed April 19th. Transplanted into garden June 14th. A very pretty plant for borders; blooms freely and being very hardy is a good plant for the North-west.

Mallow.—Seed sown in border on May 12th. Did not come up as well as usual owing to dry weather, but plants made a good show most of the summer. One of the best flowers for the North-west Territories.

Portulaca.—Sown in garden, May 12th. Did not do well early in the season but made a fair show during August.

Phlox Drummondii.—*Nana Compacta*, *Grandiflora*, *Double Yellow*, *White New fringed* and *Star of Quedlenburgh* sown in hot-bed April 19th. Transplanted into garden on June 13th. All flowered fairly well all season but did not make as good a show as the same varieties sown in garden on May 12th.

Double Yellow, *New Fringed* and *Star of Quedlenburgh* are novelties, but do not make as good a show as the old varieties. *Phlox* is one of the best flowers for the North-west and should be in every garden.

Poppy.—*Danebrog*, *Somniferum*, *White Swan* and seed grown on Experimental Farm, *Indian Head*, were sown in garden on May 12th. Very few of any of the varieties came up and none of *White Swan*. The few plants that grew did very well and made a good show.

It is hard to get the seed of the poppy to germinate in the open ground, or they would be one of our best flowers. Two plants received from the Experimental Farm, *Agassiz*, B. C., were very fine, having a small yellow flower.

Salpiglossis.—Sown in hot-bed April 19. Transplanted in garden June 13. The flowers were very fine and made a good show all season. One of the best plants for the North-west Territories.

Scabiosa. (*Tom Thumb*).—Sown in hot-bed April 19. Transplanted in garden June 13. Flowered fairly well, but is too small for this country.

Schizanthus.—Sown in hot-bed April 19. Transplanted into pots in hot-bed May 1. Put out in garden June 13. There were only six plants, but they made one of the best shows in the garden—covered with bloom all summer. Two plants were potted and did well in the house for a long time. A good flower for the North-west Territories.

Stocks.—Large flowering dwarf German Stocks in six colours were sown in hot-bed on April 11, transplanted in hot-bed in May and out in garden June 13. Two large beds were planted out and were a mass of bloom during the whole season up to hard frost. The seed this year was not as satisfactory as formerly, there being a large proportion of single with the double-white. Thirty plants were put out, and there was not a double flower in the lot. Stocks are one of the very best flowers for this country.

Sweet Peas.—*Eckford's* mixed was sown on May 12 in clusters and did fairly well considering the season. A good flower for the North-west Territories.

Verbena.—*Verbena Grandiflora* was sown in box in the house on February 7, and in hot-bed on March 26. The plants started in house were transplanted into hot-bed on April 16, and the seed sown in hot-bed transplanted in hot-bed on May 1. Both sowings did well; the former came into bloom the sooner, but was not as healthy as the sowing of March 26.

Two beds were set out in garden on June 14 and made a good show all season up to hard frost. A good flower for this country.

Nasturtiums.—*Tropæolum Majus* and *Minus*, were sown in hot-bed in pots, but neither did well. The seed sown in gardens, May 12, never came up.

Zinnias.—*Robusta* and *Pumila* were sown in hot-bed on May 1, and transplanted to garden on June 14. Both did well and made a fine show till first frost.

Wild Cucumber.—Sown around flag-pole on May 12. Did well. One of the best hardy climbers for covering rockery or trellis.

PERENNIAL PLANTS.

Dianthus.—About one-half the plants came through the winter in good shape. The bed was filled up with plants grown in hot-bed from seed sown on April 3, and planted out in garden on June 13. All flowered well during the whole season, and the young plants are strong and healthy.

Pansies.—Did not come through the winter at all well, except a few young plants that were transplanted late in the fall. Seed of Best English, Yellow, Black Centre, Bright Golden Bronze, Finest Mixed Giant and Snowflake was sown on April 3 in the hot-bed. Transplanted in hot-bed on May 1, and into garden on June 13 and 14. All grew fairly well, but the summer was too dry for Pansies. They made a fine show in October, and, on November 1, the plants were still in bloom. All plants are strong and healthy and should stand the winter well. About 400 plants were grown.

Sweet William.—The old bed came through the winter well and made a good show for over a month. It has been completely renewed with young plants and another bed planted, both of which are in good shape for the coming winter.

Forget-me-not.—Two dozen plants received from Central Experimental Farm, Ottawa, were set out, but they did not come to anything on account of the dry weather.

Roses.—The only roses that lived through the winter were two of Marshal P. Wilder, which gave a few very inferior roses.

Carnation Marguerite.—Sown April 19. Transplanted into pots May 12, and into garden on June 13. Bloomed August 1. All good double flowers. One of the best flowers for the North-west Territories.

Perennial Phlox.—Eugene Schott, Jules Jouy, Boremiham, Virgo Maria, Molier, Jeanne d'Arc, George Sand, Hamlet, Athis, Sylphide, grew well and flowered.

Hibiscus.—Alba and Rubra, 14 planted; made a growth of two feet, and one plant flowered.

Helianthus.—Very showy, growing about 4 feet high.

Flowering Flax.—Hardy and very showy. One of the best perennials for large borders.

Yellow Flax.—Very hardy. Makes a good show of fine colour.

Scarlet Lychnis.—Hardy and showy.

Veronica.—Hardy. Blue spikes of flowers. Fairly showy.

Primula.—Forty planted in garden, but did not do well.

Hollyhock.—Fine plants grown last year came through the winter well and flowered freely. Two plants from Experimental Farm, Agassiz, B.C., did extra well; making a fine show. Grew 20 young plants which are looking very strong and thrifty now.

Platycodon Grandiflorum.—Very hardy. Good showy flowers.

Sedum.—Quite hardy. Blooms freely but does not make much show.

Double Daisy.—Planted 100 in flower-garden. Made very poor growth, and flowers were small. This climate is too dry for growing them successfully.

Aquilegia.—All the old plants died. Planted this spring, 11 *Aquilegia Chrysantha*, 6 alive, 2 flowered fairly well; 6 *Aquilegia*, 3 alive.

Pæonies.—The old plants all came through winter well, but only one plant flowered.

Planted this spring four new varieties; all dead.

Narcissus.—All the *Narcissus* planted this spring lived, but very few of them flowered; all those which were planted last year are dead.

Tulips.—None of the tulips planted either this spring or last year have done well. Very few of last year's planting came through the winter.

Fritillaria.—Four planted; all flowered fairly well.

Iris.—A large number of varieties were planted last spring, sent from the Central Farm, and, as far as can be seen, are nearly all alive now. It is expected that some of the hardier forms of *Iris* will do well in this climate.

FRUIT TREES.

APPLES.

No success can yet be reported in growing apple trees.

All varieties planted in 1893 are either dead or so near it that the chances are very much against a single tree being alive in the spring.

The following 27 varieties were planted in the spring of 1893, on a plot well protected by maple hedges. Of the 184 trees set out, and all living when winter of 1893-4 came on, 36 are now barely alive ; the remainder having died during the winter or the past summer.

Name of Variety.	Spring 1893.	Fall 1894.	
	Number Planted.	Number Living.	Number Dead.
Hare Pipka	6	2	4
Miron, Grell.....	3	.....	3
Borsdorf No. 402.....	3	1	2
Simbirsk No. 3	3	.....	3
Cinnamon Pine.....	3	.....	3
Red Streaked.....	3	.....	3
Grandmother.....	3	.....	3
Round Borsdorf.....	11	2	9
Winter Stripe	11	.....	11
Simbirsk No. 5.....	3	.....	3
Miron Solovieff.....	6	.....	6
Charlamoff	3	.....	3
Early Sweet	6	.....	6
Green Crimean.....	3	.....	3
Silken Leaf.....	36	18	18
Titovka, Koslov.....	6	1	5
Persian, Bog.....	6	.....	6
Saccharine	12	2	10
Rainbow Reinette.....	3	.....	3
Simbirsk No. 11.....	6	.....	6
Little Hat.....	6	.....	6
White Pigeon.	12	2	10
Orel 27	3	.....	3
Orel 5.....	3	.....	3
Golden Reinette	3	.....	3
Polumiron.....	18	8	10
Karabovka.....	3	.....	3
Total.....	184	36	148

APPLE TREES PLANTED IN MAPLE PLANTATION.

Thirty-two trees of seven varieties were planted in a maple plantation in place of maples taken out for avenue purposes. This plantation collected the snow in winter and afforded protection from the winds in summer.

The best of those living, in the following list, are barely alive and have very small chances of going through the winter successfully.

Name of Variety.	1893.	1894.	
	Planted.	Living.	Dead.
Saccharine.....	2	1	1
Round Borsdorf.....	5	4	1
White Pigeon.....	7	.....	7
Polumiron.....	5	3	2
Winter Stripe.....	6	3	3
Titovka, Koslow.....	2	1	1
Moscow Pear.....	5	3	2
	32	15	17

It will be seen from the foregoing reports that a larger percentage lived in the maple plantation than on the plot protected by hedges.

CRABS.

Transcendent. Ten planted in spring of 1893. All dead on Nov. 1st, 1894.

HUCKLEBERRY.

Six planted in spring of 1893. Two living, fall of 1894.

PLUMS.

Plums, like apples, have heretofore been almost entire failures, but it is expected that native fruit, growing along banks of Red River and in other parts of Manitoba, may succeed here. Although trees of this variety have been growing for several years on the farm, no fruit has resulted, but it is hoped that some of the trees may produce next season.

One hundred seedlings of the wild plum were planted in 1893, and all are doing well. For 1895 planting, 42 varieties of this plum have been obtained from Mr. Frankland's nursery, at Stonewall, Manitoba.

Six Orleans Blue, 6 Montmorency and 4 Imperial Blue plum trees were planted in 1893 obtained from the nursery of A. Dupuis, Village des Aulnaies, Quebec. Of these the 4 Imperial Blues are the only ones living at this date. A small plantation was set out last spring with 81 seedlings of the Weaver Plum, and 20 seedlings of Hungarian Plum.

CHERRIES.

Except with one variety, no success has been achieved in cherry culture. This sort, Black Hill, an improved variety of the sand cherry (*Prunus pumila*) has now borne fruit for two seasons and promises to be suitable for the country.

The varieties planted in the spring of 1893, Old French and Montmorency, obtained from A. Dupuis, are all dead except one tree of the latter. The ordinary sand cherries (*Prunus pumila*) planted at the same time are doing well.

In May last, the following cherries were planted in a plot well protected from winds:—15 Ostheim Seedlings, 20 Lithaur Weichsel, 20 Minnesota Ostheim, 5 Carnation, 13 Rocky Mountain and 3 Sand Hill Cherries from Dakota. A plantation of 180 sand cherries was also set out; the trees 7 feet apart each way.

SMALL FRUITS.

GOOSEBERRIES.

Twenty-two varieties (58 bushes), mostly English varieties, of this fruit were planted in spring of 1893. Several of the sorts died before winter set in, and all but 30 bushes of 10 varieties have died since.

Following is the list, &c. :—

Name of Gooseberry.	Planted.	Living.	Dead.
Leader.....	1	.....	1
Companion.....	1	.....	1
Whitesmith.....	1	.....	1
Early Sulphur.....	1	1	
Bonnie Lass.....	2	.....	2
Bobbie.....	1	.....	1
Governess.....	2	1	1
Warrington.....	1	.....	1
Crown Bob.....	2	.....	2
Queen Victoria.....	2	1	1
Improved Early Hedgehog.....	1	.....	1
Dublin.....	1	1	
Lancashire Lad.....	1	1	
Green Overall.....	2	.....	2
Columbus.....	2	2	
Pitmaston Green Gage.....	1	1	
Red Champagne.....	1	1	
Whinham's Industry.....	1	.....	1
White Champion.....	1	.....	1
Industry.....	10	.....	10
Downing.....	18	18	
Native from Edmonton, N.W.T.....	5	3	2
	58	30	28

CURRENTS.

The following currants were planted in spring of 1893, but have not yet borne fruit:—Red, London Red, Versailles, Red Dutch, Knight's Early Red, New Red Dutch, White Transparent, La Fertile, La Condé and La Hâtive—Black—Prince of Wales, Ogden's Black and Baldwin, Dakota Tree Currant.

BLACKBERRIES AND RASPBERRIES

The following varieties were planted in spring of 1893 :—50 Stone's Hardy Blackberry, 50 Shaffer's Colossal, 50 Crimson Beauty, 50 Ohio, and 2 Blackcaps from Edmonton, N.W.T. All are dead except 4 Shaffer's Colossal, 8 Ohio and 1 Black Cap from Edmonton.

STRAWBERRIES.

The following were planted in 1893 :—24 Parker Earle, 24 Windsor Chief, 24 Pine Apple and 24 New Dominion. All were badly winter killed in 1893 and remainder died during 1894.

SMALL FRUIT CROP, 1894.

The crop of small-fruits on the Experimental Farm has, on the whole, been very poor the past season.

Currants, Red, White and Black produced abundantly, but the fruit was very much smaller than usual on account of the dry weather. Raspberries promised extra well

early in the season, but were an entire failure. Gooseberries and strawberries were as bad.

Following will be found the results in detail of different varieties of small fruits bearing fruit in 1894.

RED CURRANTS.

Fay's Prolific.—Set a good crop of fruit which ripened fairly well.

Baby Castle.—Produced a heavy crop of fruit, which was very much dried up by hot weather.

Red Dutch.—Set a very heavy crop of fruit which was badly damaged by dry weather.

Red Victoria.—A heavy crop of fruit, badly injured by drouth.

WHITE CURRANTS.

White Grape.—A very heavy crop of fruit which withstood the drouth much better than the Red varieties.

White Dutch.—Heavy yield. Slightly hurt by drouth.

BLACK CURRANTS.

Black Naples.—Heavy crop of fruit. Fruit small and did not ripen evenly.

Lee's Prolific.—Heavy crop. Fruit fair quality, although considerably injured by dry weather.

Climax.—A good crop. Fruit small. Ripened unevenly.

Charmer.—A good crop. Fruit small. Ripened unevenly.

Beauty.—A good crop. Fruit small. Ripened unevenly.

Dominion.—A good crop. Fruit fair size.

PROSPECTS OF A CURRANT CROP IN 1895.

The Red and White varieties of Currants are not in a thrifty condition and do not promise well for a crop next year. The greater part of the leaves fell off in mid-summer and the fruit buds are small and parched looking.

The Black sorts have a good stock of healthy young wood and the indications at present are in favor of a good crop for 1895.

RASPBERRIES.

Covered with earth during winter; uncovered on May 9.

Turner—Came out in splendid condition, blossomed and formed fruit well, but dry weather caused leaves to blight and fall off, and no fruit ripened.

Philadelphia—Came out in fair order, but went in same way as Turner.

Cuthbert, Hansell, Caroline and Golden Queen were badly winter-killed and came from the winter covering in poor condition, and being less able to stand the dry, hot spell, no fruit whatever set.

All the varieties have made a good growth from the roots but the canes are not as strong as they usually are at this season of the year.

GOOSEBERRIES.

Like all other small fruit, gooseberries were a light crop the past season. The tops of the bushes were cut back considerably and the bushes started out in very poor shape. Dry weather made what little fruit there was, very small.

STRAWBERRIES.

Strawberries came through the winter in a more or less damaged condition. One bed had two-thirds of its plants killed outright. None of the plants blossomed freely, and dry weather caused the fruit to be very small, none of which ripened.

The vines were covered slightly with strawy manure, and the beds had a large bank of snow over them all winter. They were uncovered on May 9.

NATIVE FRUIT.

Two varieties of native black currants, 2 of gooseberries, 1 raspberry, 1 cranberry, 2 saskatoons and 2 cherries bore fruit the past season.

The black currants were a heavy crop of very large fruit where the bushes had been thinned out; gooseberries, very small, but numerous; raspberries did not ripen; cranberries, ditto; saskatoons, a small crop, and cherries few and small.

CUTTINGS, 1894.

1,400 cuttings of white, red and black currants were set out last May; 204 are now alive. The loss was caused, no doubt, by dry weather.

Conclusions arrived at regarding fruit growing in North-west Territories:—

1. That no variety of apples has, so far, proved suitable to the North-west Territories.
2. That Eastern plums or cherries have not succeeded, but that the native Plum of Manitoba, as well as a cherry, a native of the Western States, will fruit and do well here.
3. That cultivated varieties of small fruits do well in an ordinary year, but are liable to suffer from drouth.
4. That raspberries and strawberries require protection in the winter months.
5. That Turner is the best variety of raspberry thus far tested for the North-west Territories.
6. That Red, White and Black Currants are a safe fruit to plant and require no covering in the winter.
7. That gooseberries are very uncertain and are liable to be killed back.
8. That strawberries are the most uncertain of all fruits. If they escape the winters they are easily injured at time of blossoming, by frost, or when fruit is ripening by dry weather.
9. That all small fruits require good protection from winds in the early part of the growing season, and without this there is not much likelihood of success.
10. That anything that retards for ten days or two weeks, the blossoming of small fruits will much increase the chances of a good crop, provided there is sufficient moisture to ripen the fruit.

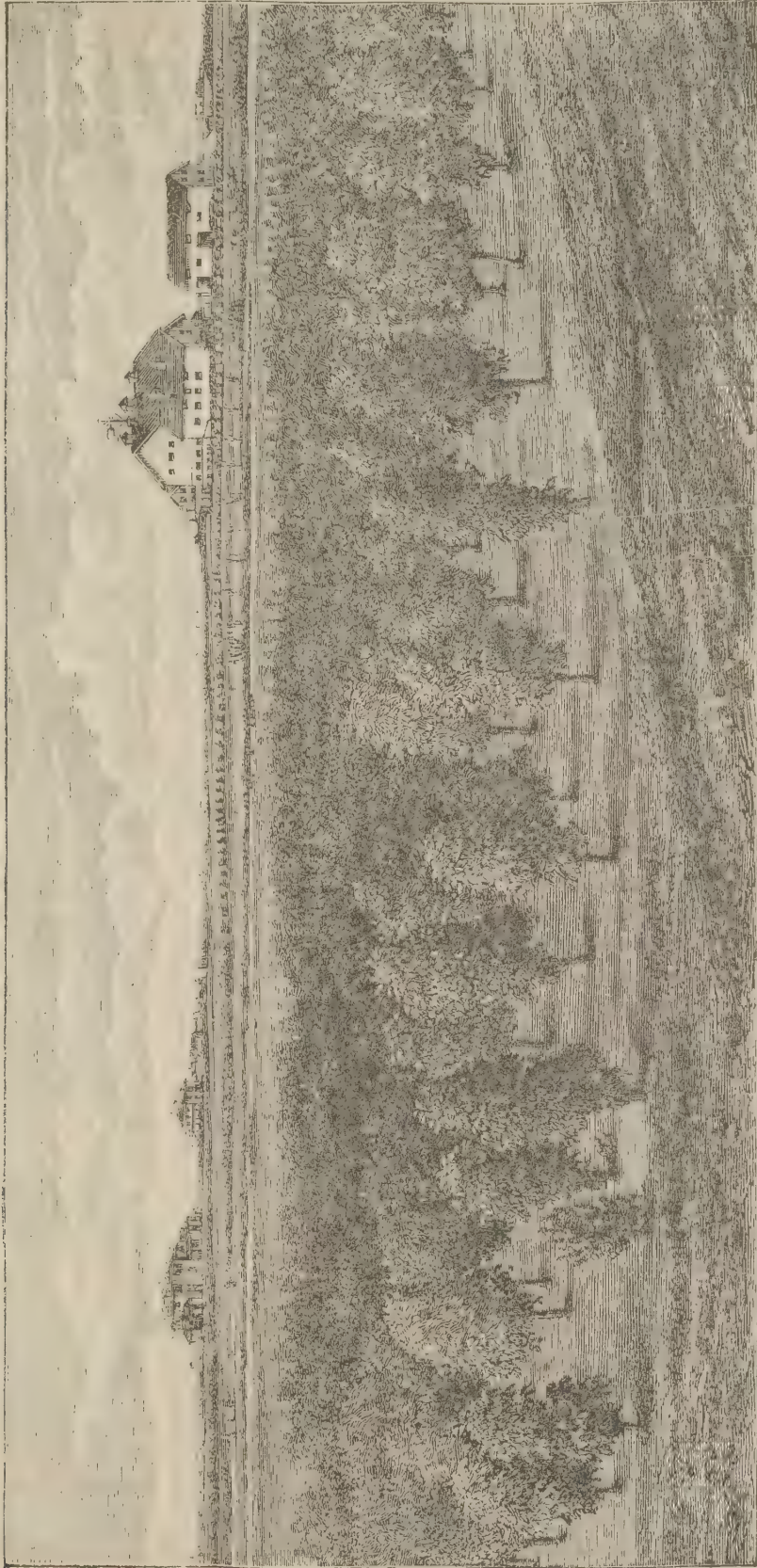
FOREST TREES.

The past season, on account of the dry weather, has not been favourable to forest trees. Early in the season, the trees of all sorts came out in leaf and for two months made a rapid growth. Where trees were planted in single rows and the soil around them worked occasionally, they continued to make some progress, but in shelter belts or plantations where the trees are comparatively close together, the dry hot weather early in July stopped nearly all growth and the leaves fell off long before the first frost.

The growth made, although small, seems to have hardened up, and all trees promise well for the coming year.

The value of fallow-land for tree planting was demonstrated in a marked degree, the past season. Among the trees planted along each side of a road on the farm, were 19 trees on sod and 553 on land that had been fallowed the year previous. At this date every tree planted on sod is dead; while not one loss has occurred in the 553 on fallowed-land. The same fate overtook trees or shrubs planted on lawns or other places about the farm where sod or grass exists; while others, planted in ground that had been cultivated and where frequent cultivation was possible, stood the dry weather all right.

Two new plantations, of four and three acres each in extent, were put out with maples, the past spring. The trees were planted 4 feet apart in the rows and 7 feet between the rows. This was done to permit of two-horse cultivation, either by single or gang ploughs. Heretofore the usual distance apart has been 5 feet each way. For



View of a portion of five acre block planted with Box Elder, in the spring of 1890.

three years after planting this distance is satisfactory but when the branches extend, usually about the fourth year, cultivating cannot be thoroughly done; so the 7 feet by 4 feet has been adopted for the present with a view of finding out which is the best distance apart for forest-trees, with the idea of economy in cost of working. Particulars of the cost of planting and cultivation of these new plantations will be kept.

The accompanying view represents part of a five acre plot planted four years ago.

TREES GROWING ON FARM.

The following trees, native and introduced, are growing on the farm at present.

NATIVE.

Planted in	Name of Variety.	Condition.
1889 to 1894....	Maple, Box Elder. (<i>Negundo aceroides</i>).....	Doing well.
1890.....	Ash. (<i>Fraxinus Americana</i>).....	Growing slowly.
1890.....	Elm. (<i>Ulmus Americana</i>).....	"
1892.....	Oak. (<i>Quercus macrocarpa</i>).....	Very slow growth.
1890.....	Birch. (<i>Betula papyrifera</i>).....	Slow growth.
1890.....	Poplar. (<i>Populus alba</i>).....	Fair growth.
1890.....	Balsam poplar. (<i>Populus balsamifera</i>).....	"
1890.....	Willow. (<i>Salix</i> 3 varieties).....	Slow growth.
1892.....	Buffalo-berry. (<i>Shepherdia argentea</i>).....	Growing well.
1890.....	Choke Cherry. (<i>Prunus Virginiana</i>).....	"
1890.....	Wild Red Cherry. (<i>Prunus Pennsylvanica</i>).....	"
1890.....	Cranberry. (<i>Viburnum Opulus</i>).....	"
1890.....	Saskatoon. (<i>Amelanchier alnifolia</i>).....	"
1893.....	Spruce. (<i>Picea alba</i>) from Prince Albert, Sask.....	Very slow growth.
1893.....	Spruce. (<i>Picea alba</i>) from Manitoba.....	"

INTRODUCED.

Planted in	Name of Variety.	Condition.
1890.....	Russian Poplar. (<i>Populus Bereolensis</i>).....	Good.
1890.....	Russian Poplar. (<i>Populus Wobstii Riga</i>).....	"
1890.....	Russian Willow. (<i>Salix Voronesh</i>).....	"
1890.....	Willow. (<i>Salix aurea</i>).....	"
1890.....	Willow. (<i>Salix acutifolia</i>).....	"
1890.....	Willow. Norway.....	"
1890.....	Willow. (<i>Salix laurifolia</i>).....	"
1891.....	Elm Nebraska. (<i>Ulmus Americana</i>).....	Kills back, hardening
1891.....	Asiatic Maple. (<i>Acer Ginnala</i>).....	Doing well.
1892.....	Oak. (<i>Quercus alba</i>).....	Very slow growth.
1892.....	Common Alder. (<i>Alnus glutinosa</i>).....	Cuts back.
1892.....	Butternut. (<i>Juglans cinerea</i>).....	Very slow growth.
1890.....	American Cottonwood. (<i>Populus monilifera</i>).....	Rapid growth.
1889.....	Cedar. Arbor Vitæ. (<i>Thuya occidentalis</i>).....	Very slow growth.
1890.....	Red Cedar. (<i>Juniiferus Virginiana</i>).....	"
1890.....	American Mountain Ash. (<i>Pyrus Americana</i>).....	Kills back badly.
1890.....	European Mountain Ash. (<i>Pyrus aucuparia</i>).....	"
1890.....	Norway Spruce. (<i>Picea excelsa</i>).....	Very slow growth.
1890.....	White Birch. (<i>Betula alba</i>).....	Not very healthy.
1890.....	Yellow Birch. (<i>Betula lutea</i>).....	"
1890.....	Scotch Pine. (<i>Pinus sylvestris</i>).....	Some doing extra well
1890.....	Riga Pine.....	Very slow growth.
1890.....	Mountain Pine. (<i>Pinus Mughus</i>).....	Doing well.
1890.....	Yellow or Bull Pine. (<i>Pinus ponderosa</i>).....	"
1890.....	Douglas Fir. (<i>Pseudotsuga Douglassi</i>).....	Doing fairly well.
1890.....	Poplar. (<i>Populus aurea</i>).....	Good.

Additions were made to wind-breaks on farm last year, both by transplanting and sowing seed. Those already planted were of very great service during the whole of last

summer in breaking the force of winds and in the garden plots were invaluable in protecting vegetable and other seeds from destruction.

The following is from my report of 1893 on wind-breaks or hedges, which I beg to again submit to those who may desire to sow or plant wind-breaks in the North-west Territory :—

“The wind-breaks already set out demonstrate that one row of *Artemisia* or Willow, with plants two feet apart in the rows, is ample, and one row of Maple or Poplar is also sufficient if the trees are cut back several times each season for a few years, so as to allow them to thicken up at the bottom.

“I desire to call the attention of those in the North-west who may wish to have a small and pretty hedge on their lawn or elsewhere, to the fact that the Native Wolf Willow (*Elæagnus argentea*) and Native Snowberry (*Symphoricarpus racemosus*), both found in abundance on the prairie, are excellent for that purpose. Either grown from seed or transplanted, they are cheaply and easily obtained and in two or three years, with pruning can be made attractive as any eastern hedge.

“Two hedges made from transplanted plants of these shrubs, attract attention of visitors to the farm, and besides being ornamental are useful as a wind-break around the flower-beds and other plots.”

To the foregoing may be added that one row of maple-seed sown about 1st May will make the best wind break around buildings and along roads, when appearance and labour are taken into consideration. If maple is used for gardens, etc., not more than one row should be sown or planted together, as even one row absorbs a great deal of moisture from land in immediate vicinity.

Artemisia Abrotanum (Russian) has made the best wind-break and by far the best snow-gatherer for gardens yet tried on the farm ; and although not very ornamental, except when green, should be around every garden in the North-west Territories.

For two years back a number of Norway spruce and Scotch and Riga Pine have been transplanted from former plantations, and in both years those transplanted in June have lived ; while those set out in May have died with very few exceptions. Winds which are usually worst in May caused the loss amongst those planted early, they not having had time to take root before being almost blown out of the ground.

TREE SEEDS SOWN, AND TREES TRANSPLANTED, 1894.

In May last a good sized plot was sown with maple-seed and from this there are now from 15 to 25,000 seedlings ready for distributing or transplanting next Spring.

As stated elsewhere, seven acres were planted with maple-trees. In addition to this, 572 trees were set out along roads, and blanks were filled up in avenues and other places. The avenue trees transplanted were drawn from a plantation set out in 1890 and were from 5 to 7 feet high. The trees planted in new plantations were two years old. Avenue trees were all planted in holes dug large and the roots of trees placed a little deeper than where grown.

For plantations drills are made as deep as can be made by plough going twice in each one. If drills are long, two men follow, carrying an armfull of trees and planting them at the proper distance apart in bottom of drill, then covering roots by drawing earth with their feet from each side. When planting is finished, the drills are filled in by plough, using one horse. One man, with team and three men assisting, can plant from 3 to 4 acres in this way in a day.

Summer fallowing is the best preparation for tree planting, as it affords moisture for the young trees after the dry season sets in. If fallow is not available, stubble land may be used but will require more cultivation the first year than the fallow. It is wasting time and trees to plant in sod or in land that can not be properly cultivated.

In 1893 there were between 115 and 120 thousand trees of all sorts on the Experimental Farm ; consisting chiefly of native maple (*Negundo*). During the past season this number has been greatly added to by seedling-maples which will be ready for distributing or transplanting next spring.

The following is a list of trees and where growing on Experimental Farm, 1894.

TREES—1894.

Where growing, etc.	Variety.	Planted or Sown.	Number.
Along West boundary—100 feet wide	Maple.....	Planted	10,804
“ North boundary— “	“	“	10,551
“ North “	Ash.....	“	240
“ North “	Elm.....	“	250
“ East “ 1 and 2 years old	Maple.....	Sown	20,000
Plantations on North part of Farm.....	“	Planted.....	6,072
“ around Buildings.....	“	“	2,574
“ “ “	Ash.....	“	1,746
“ on South part of Farm.....	Maple.....	“	15,810
Wind-breaks along cross-roads	“	Sown	10,780
“ around garden-plots	“	Planted.....	1,711
“ “	Elm.....	“	269
“ “	Poplar.....	“	734
“ “	Willow.....	“	650
Avenue Trees.....	Maple.....	“	2,683
Plantation.....	Elm.....	“	3,700
For transplanting.....	Ash.....	Sown.....	3,800
Seedlings.....	Maple.....	“	20,000
Two years old	“	“	8,000
Riga Pine, 470. Cedar, 16.....	“	Planted	486
Birch, 58. Norway Spruce, 630.....	“	“	688
Russian Poplar, 50. Mountain Ash, 128.....	“	“	178
Scotch Pine, 160. Basswood, 15.....	“	“	175
Mountain Pine, 47. Cottonwood, 300.....	“	“	347
Oak, 20. Douglas Fir, 17.....	“	“	37
Yellow Pine, 219.....	“	“	219
Shrubs	“	“	6,870
Fruit, cultivated, 423. Native, 100.....	“	“	523
Total.....	.....	.....	129,897

SHRUBS.

It gives me pleasure to report that the list of shrubs, doing fairly well on the farm, is increasing.

Although many of the sorts kill back partially in the winter and are growing slowly, they are all making some progress, both in size and ability to stand the climate.

Among those doing well, Caragana is first in growth and hardiness ; Artemisia Abrotanum continues to do well as a hedge ; Lilacs, Common White, Persian and Josikea have flowered and given good satisfaction and Acer Ginnala, Russian Olive and Flowering Currant have made a fair growth and stand the winter well. Most of the other shrubs tested are cut back during winter and their growth is very slow.

The Native Shrubs, such as Hawthorn, Silver Berry, Snowberry and Buffalo Berry, do well.

Following is list of shrubs on farm, condition and date of planting.

SHRUBS—1894.

Name.	Year planted.	Condition.
Barberry (<i>Berberis Thunbergii</i>).....	1891.....	Very slow growth and kills back
“ Common (<i>Berberis vulgaris</i>).....	1891.....	“ “
“ “ (<i>Berberis elegans</i>).....	1891.....	“ “
Caragana arborescens, Siberian Pea tree.....	1890.....	Hardy, doing well.
“ Redowsky.....	1892.....	Hardy.
“ frutescens.....	1892.....	“
Lilac, Persian.....	1892.....	Hardy, flowered.
“ Common white.....	1892.....	“
“ Josikea.....	1892.....	“
“ Silver White.....	1892.....	“
“ Jacques Cabot.....	1892.....	“
“ Prince of Wales.....	1892.....	“
Honeysuckle, Tartarian.....	1892.....	“
“ Tartarian.....	1893.....	“
Spiræa Opulifolia.....	1890.....	Cuts back.
“ Douglasi.....	1891.....	“
Syringa, Double-flowering.....	1891.....	“
“ alba grandiflora.....	1891.....	“
“ Golden-Leaved.....	1890.....	Hardy, flowered.
“ Gordon's.....	1890.....	“
Flowering Currant.....	1892.....	“
Russian Olive.....	1892.....	Hardy.
Artemisia Abrotanum Tobolskianum.....	1890.....	Cuts back, but hardy.
Artemisia Abrotanum, Old Man.....	1893.....	Hardy.
Acer Ginnala.....	1891.....	“
Common Alder.....	1892.....	Cuts back.
<i>Native.</i>		
Silver Berry (<i>Elæagnus argentea</i>).....	1890.....	Very hardy.
Snow Berry (<i>Symphoricarpus racemosus</i>).....	1890.....	“
Hawthorn (<i>Cratægus Coccinea</i>).....	1890.....	“
Sweet Briar (<i>Rosa rubiginosa</i>).....	1890.....	Tender.

The following shrubs, etc., were planted last spring.

SHRUBS.

Name.	Name.
Lilacs—	Almond Double Rose.
Gloire de Lorraine.	“ “ White.
Flora Plena.	Persian Yellow Rose.
Emodi.	Hibiscus Hardy.
De Marley.	Elæagnus longipes.
Nigricans.	“ macrophylla.
Laciniata.	Berberis Cerasua.
Souvenir de la Spathe.	“ laciflora.
Langius.	“ Fischeri.
Matthieu de Dombasle.	“ macrophylla.
Rubra insignis.	“ Sinensis.
Ambroise Verschaffelt.	Russian Snowball.
Common White.	Lonicera media.
Violacea.	“ Germanica.
Persian White Flowering	“ Vor 133.
President Massart.	Russian Euonymus.
Japonica.	Prunus Maackii.
Bertha Damman.	Prunus Grayana maxima.
Virginal.	Lonicera splendens.
Ville de Troyes.	Improved Elderberry.
Princess Marie.	Hypericum Kalmianum.
Persian Small Flowering.	Betula Dahurica.
Hyacinthæflora.	Pyrus.
Gloire de Croncels.	Cotoneaster vulgaris.
Renoncule.	Caragana Redowsky.
Mme. Moser.	“ pygmæa.
Lavanensis.	Philadelphus —.
Villosa.	Spiræa media rotundifolia.
Cærulea superba.	Spiræa opulifolia.
Beranger.	Rosa rubrifolia livida.
Pyramidalis.	Lonicera chrysantha.
Sangeana.	Viburnum rugosum.
Prof. Stochart.	“ Pyræfolium.
Dr. Lindley.	Crataegus sanguinea Schroederi.
Common Purple.	Ligustrum Amurense.
Cornus mascula elegantissima.	Rosa rugosa.
Exochorda grandiflora.	Basswood from Manitoba seed.
Weigelia Lonerii.	Acer Ginnala.
“ candida.	Douglas Fir.
“ Henderson's.	Yellow Pine.
“ rosa nana variegata.	

CONCLUSIONS ARRIVED AT IN REGARD TO TREE CULTURE IN THE NORTH-WEST TERRITORIES.

1. That trees can be grown on the most exposed situations.
2. That tree-seeds should be sown on the farm so that transplanting can be done on the spot; the trees not having to be transported any distance before being set out.
3. That native trees should be chiefly used until protection is afforded by them, when foreign varieties may be introduced with hope of success.
4. That about the first week in May is the best time to sow maple, elm, and ash seed, also the best time for transplanting all deciduous trees.
5. That June is the most favourable time for transplanting evergreens.
6. That tree seeds should be sown in rows on fallow-land, the plants kept free from weeds and the ground stirred frequently during the first season.
7. That trees should be planted or transplanted when young, on fallow land, two or three inches deeper than where they first grew and the ground ploughed, gang-ploughed or scuffled several times during the season for three or four years. Trees should be far enough apart to permit a span of horses to work freely, so that the land may be kept loose and free from grass with the least expense.

8. That Manitoba maple or Box Elder grows the quickest of all native trees and for windbreaks or plantations gives the most satisfaction.

9. That it is a waste of time, money and trees, to plant without good preparation before and frequent cultivation after.

DISTRIBUTION

of Grain samples, Forest-trees, Fruit-bushes, Tree-seeds, Potatoes, Flower-seeds, Vegetable seeds, &c.

Last spring, during March, April and May, the following distribution was made:—

Distribution of	Number.	Total Number.
Grain—		
Wheat, three pound bags.....	176	
Barley “ “.....	154	
Oats “ “.....	296	
Rye “ “.....	18	
Pease “ “.....	73	
Awnless Brome Grass.....	101	818
Forest trees—		
Maple.....	10,800	
Elm.....	175	
Ash.....	1,125	
Willow.....	445	
Poplar.....	325	
Cottonwood.....	850	
Caragana.....	735	
Lilac.....	46	
Syringa.....	15	
Evergreen Shrubs.....	60	14,576
Small fruits—		
Raspberries, Turner.....	1,816	
Philadelphia.....	1,298	
Caroline.....	372	
Reeder.....	301	
Cuthbert.....	24	3,811
Currants—		
Red Dutch.....	1,518	
Fay's Frolific.....	1,028	
White Grape.....	1,056	
Raby Castle.....	828	
Black Naples.....	1,736	
Lee's Prolific.....	648	
Mixed.....	617	7,431
Gooseberries (mixed).....	992	992
Strawberries.....	442	442
Asparagus roots.....	1,572	1,572
Rhubarb roots.....	173	173
Tree seeds—Maple—Bags.....	532	532
Potatoes—Various sorts—Bags.....	286	286
Vegetable and Flower seeds—Collections.....	276	276
Artemisia Abrotanum—Cuttings.....	6,085	6,085
Summary.		
Grain.....	818	
Forest trees, including Artemisia cuttings ..		20,661
Small fruits.....		12,234
Strawberries.....		442
Vegetable roots.....		1,745
Tree seeds.....	532	
Potatoes.....	286	
Vegetable and Flower seeds—Collections in bags.....	276	
	1,912	35,082

EXPERIMENTS IN FEEDING STEERS.

Experiments were carried on last winter in feeding steers with the different fodders at command.

One test was made with the following rations :—1. Ensilage, meal and straw ; 2. Dry cut feed, turnips and meal ; and 3. Hay, turnips and meal. Six 2 year old steers were fed in this test for four months, one month being preparatory.

Lot No. 1 was fed on ensilage, meal and all the oat-straw they would eat. Lot No. 2 was fed on cut-feed, consisting of mixed grain fodder, meal and turnips. Lot No. 3, on hay, turnips and meal.

RESULT.

Lot No. 1.—Fed 35 lbs. ensilage, 5 lbs. meal (barley and oats ground) and oat-straw.

Weight.	Dec.	Jan.	Feb.	March.	April.	Gain.
Steer No. 1	880	927	1000	1037	1107	} 497 lbs.
“ 2	850	897	955	1050	1120	

Lot No. 2.—Fed 15 lbs. cut dry fodder, 20 lbs. turnips, and 5 lbs. meal, same as in No. 1.

Weight.	Dec.	Jan.	Feb.	March.	April.	Gain.
Steer No. 1	925	954	1010	1080	1145	} 422 lbs.
“ 2	770	822	870	915	972	

Lot No. 3.—Fed on 18 lbs. hay, 20 lbs. turnips and 5 lbs. meal, same as No. 1.

Weight.	Dec.	Jan.	Feb.	March.	April.	Gain.
Steer No. 1	1060	1107	1140	1182	1220	} 332 lbs.
“ 2	1052	1082	1120	1185	1220	

The six steers for the above test were bought at 2¼ cents per pound and sold at 3½ cents per pound.

Lot No. 1.—Cost \$42.57 and sold for \$77.94.....	Gain of \$35.37
“ 2.— “ 46.60 “ 74.44.....	“ 27.84
“ 3.— “ 58.02 “ 85.40.....	“ 27.38

TEST NO. 2.

Three steers, 5 years old, fed on different rations for 5 months.

Steer No. 1.—Fed on 50 lbs. ensilage, 8 lbs. meal, and straw—

	Dec.	Jan.	Feb.	March.	April.	May.	Gain.
Weight, 1640	1717	1740	1780	1786	1760		120 lbs.

Steer No. 2.—Fed 25 lbs. cut fodder, 8 lbs. meal and 20 lbs. turnips—

	Dec.	Jan.	Feb.	March.	April.	May.	Gain.
Weight, 1500	1540	1610	1690	1757	1755		255 lbs.

Steer No. 3.—Fed 25 lbs. ensilage, 15 lbs. cut feed and 8 lbs. meal—

	Dec.	Jan.	Feb.	March.	April.	May.	Gain.
Weight, 1620	1650	1720	1790	1890	1890		270 lbs.

Steer No. 1.—Cost at 3 cts., \$49.20, sold for 3¾ cts., \$66.00.	Profit, \$16.80
“ 2.— “ 3 cts., 45.00, “ 3¾ cts., 65.80.	“ 20.80
“ 3.— “ 3 cts., 48.60, “ 3¾ cts., 70.87.	“ 22.27

In the above test, ensilage, cut-feed and meal gave the most gain in weight and realized greatest amount of money for feed consumed. Steer No. 1 did not do well while Nos. 2 and 3 made good gain from the first.

EXPERIMENTS IN FEEDING

SWINE.

Swine have done well during the past year.

Two Improved Large Yorkshire sows, Snowie and Dora had litters about the 1st of January of 7 and 8 pigs respectively. The same two sows had litters again in June of 10 pigs each.

By keeping the pigs born in January in a fairly warm place, all lived but grew very slowly and when 10 months old were not nearly as large as pigs usually are at that age, although they were fed regularly with as much as they would eat.

Ten of these pigs were penned off and fed for two months with very little grain. They consumed over 7 lbs of grain for each pound of pork made; which was probably from effects of cold weather they underwent when young.

Although the pig house was comfortable except in extreme weather, some pigs from a litter born in September, 1893, died during the winter. As they could not run outside, they became crippled for want of exercise and were only able to move with great difficulty, and at length had to be killed. This is of frequent occurrence with litters born in the fall and even if with the greatest care they are brought through the winter, the cold they have to encounter has a serious effect on their after growth.

A young Tamworth boar was obtained from the Central Experimental Farm in July last. This animal will be used for crossing and will prove valuable to the neighborhood.

TESTS.

During last winter a test was made between feeding pigs on soaked wheat and on boiled wheat, resulting in favour of soaked wheat.

Two pens of four pigs each (a mixed lot) were put up on December 6, and fed until April 6. One pen was fed on wheat soaked for 24 hours, and the other on boiled wheat.

Following is the result in detail:—

WHEAT, SOAKED *vs.* BOILED.

Pen No. 1—Soaked—

	Dec.	Jan.	Feb.	March	April	Lbs.
Weight,	317	443	536	664	784.....	Gain 467

Pen No. 2—Boiled—

	Dec.	Jan.	Feb.	March	April	Lbs.
Weight,	275½	374	447	517	627.....	Gain 351½

The pigs in pen No. 1, consumed 2160 lbs., wheat.

“ “ “ 2 “ 2100 lbs. “

Therefore, in this experiment it took 4½ lbs soaked wheat to make one pound of pork; and 6 lbs. of boiled wheat to make the same quantity.

Pork at 6 cents per lb. would make the wheat consumed in pen No. 1, worth 74 cents and in pen No. 2, worth 60 cents per bushel.

TEST OF WHEAT *vs.* BARLEY AND WHEAT.

In this test 10 Improved Large Yorkshires were divided into two pens of 5 pigs each; as nearly equal in weight as it was possible to get them; there being only 5 lbs difference between the two.

One pen was fed on soaked wheat and the other on soaked wheat and barley, mixed. The test commenced on September 1st, and on November 1st the pigs in pen No. 1, fed on wheat alone, had made one pound of pork for every $8\frac{1}{2}$ lbs. wheat used; while pen No. 2, fed on wheat and barley, made one pound of pork for each 6 lbs. grain eaten.

The ten pigs used were born on December 28th, 1893, and January 3rd, 1894, and on account, no doubt, of the extreme cold experienced early in their existence, were small for their age when the test commenced. This may account for the large quantity of grain consumed in comparison with the amount of pork made.

FOLLOWING IS TEST IN DETAIL

Pen No. 1—Fed on soaked wheat—

	Sept. 1st.	Oct. 1st.	Nov. 1st.	Lbs.
Weight,	618	751	820.....	Gain 202

Pen No. 2—Fed on soaked wheat and barley—

	Sept. 1st.	Oct. 1st.	Nov. 1st.	Lbs.
Weight,	623	778	898.....	Gain 275

Pen No. 1—Consumed, 1,757 lbs. wheat; made 202 lbs. pork, or $8\frac{1}{2}$ lbs. feed to 1 lb. of pork.

Pen No. 2—Consumed, 1668 lbs. wheat and barley; made 275 lbs. of pork, or 6 lbs. feed to 1 lb. of pork.

PIG-HOUSE.

The pig-house erected in the summer of 1893 is not entirely satisfactory, the walls being made of concrete, lime, sand and broken stones. The building is too damp during the winter months, for pigs.

In very cold weather a heavy coating of ice forms on the inside of the walls; then on a warm day this melts and produces a wet and unpleasant condition.

POULTRY.

The poultry on the farm has not been very successful during the past year. After a long winter of confinement, none of the birds came out in very good shape for laying and very few of the early laid eggs were fertile.

The Plymouth Rocks commenced, early, to pull their feathers and continued to do so in spite of all remedies tried.

The White Leghorns did the best of any of the four breeds on hand, both in regard to number of eggs laid, and chickens hatched.

Four settings of eggs, one each of Black Minorca, Light Brahma, White Leghorn and Plymouth Rock, were received from the Central Experimental Farm, Ottawa, last May. From these 8 Black Minorca, 6 light Brahma, 6 White Leghorn and 5 Plymouth Rock, chickens were raised.

There are on the farm, at present, the following breeds Black Minorca, Light Brahma, White Leghorn, Plymouth-rock, Houdan and White Wyandotte.

STALLION.

The Clyde stallion "Barlocco," sent by the Haras National Company, from Montreal, reached the farm on May 3rd, and remained for three months, serving 43 mares during that time.

LAND PREPARED FOR CROP OF 1895.

During the past season, 165 acres of land were fallowed and made ready to receive the crop of 1895.

The first ploughing was completed by July 12th, with single ploughs turning from 6 to 8 inches deep. The portion ploughed early in the season was harrowed, prior to this date, to induce weeds to germinate; a result somewhat difficult to obtain on account of the dry weather.

After the ploughing was finished, all the land was well harrowed. After harvest a large portion of it was gang-ploughed light, and the balance harrowed with either disc or spring-tooth harrows.

In addition to the summer fallow, ten acres of oat land were ploughed in the fall after the crop had been taken off.

Sixty-five acres of stubble-land were gang-ploughed after the crop had been harvested, with the intention of starting all weeds and volunteer grain this fall. This land will be fallowed next year.

Seven acres of the fallow-land intended for roots next year, had a heavy coating of manure, well rotted, put on late in the fall. Part of the field was ploughed after the manure was applied and the balance left as it was.

The remainder of the year's manure is being put on stubble-land intended for fallowing next year. This has been found to be the best and safest way of applying manure in the Territories. No matter how well rotted, if applied in the fall or spring to land to be cropped at once, if the season be dry the manure will keep the land open and instead of being a benefit will prove an injury. If, however, it is applied on stubble-land and the land fallowed, the manure gets well worked in and the June rains complete the rotting process thoroughly.

ENSILAGE.

Corn ensilage was a decided success the past winter. Although the crop was small and the ensilage far from filling the silo, what there was of it was good and was eagerly eaten by the stock.

Ensilage made from mixed grain crops, cut when well headed and left for two days to wilt, was also a success; but that made from the same mixed grain crop, left until the heads were filled, though not nearly ripe, was a complete failure. From fifteen to twenty loads of the latter were cut by ensilage cutter and put in silo. Up to Christmas it appeared to be alright but when required for use was found to be quite dry from top to bottom except in a few patches where a small amount of moisture had been retained which were the only parts the cattle would eat.

On account of the mixed grain crop being very light and poor, no ensilage was made from this kind of fodder, the past year. Corn alone was put in silo and being further advanced than in former years the ensilage will no doubt turn out well.

IMPROVEMENTS.

The improvements made on the farm during the past season were in taking down some old cottages along the railway, improving the reservoirs on the farm, planting seven acres of maple trees and putting out nearly two miles of avenue trees.

LOCAL EXHIBITIONS AND INSTITUTE MEETINGS.

The only exhibitions attended with products of the farm were Regina and Indian Head.

Wolseley, Broadview, Wapella, Fairmede, Qu'Appelle Station and Fort Qu'Appelle fairs were attended by myself or staff, who assisted as judges.

During last winter I attended farmers' meetings in Moose Jaw, Pense, Qu'Appelle Station, Wolseley, Grenfell, in Assiniboia, and in June last, a large meeting of farmers in Saskatoon, Sask., at all of which papers were read on the work of the Experimental Farm.

VISITORS TO FARM.

The number of visitors to the farm from a distance slightly decreased during the past season, owing to the train service being a midnight one until after harvest. Local visitors were more numerous than in any year previous.

CORRESPONDENCE.

During the ten months ending November 1st, 1,720 letters were received and 2,448 letters despatched. In letters received are not included reports on grain and other samples, and in letters despatched, circulars of instruction regarding samples, &c., are not counted.

METEOROLOGICAL OBSERVATIONS.

Temperature, maximum and minimum, for 10 months; average temperature for growing season; range of temperature for growing season; sunshine for growing season; rainfall for growing season and days cloudy during growing season:—

Location.—Longitude 102° West. Latitude 52° North. Altitude, about 2,000 feet.

TEMPERATURE.

Maximum and minimum, 10 months, from January 1 to October 31, 1894.

Months.	Maximum.			Minimum.		
January.....	On	13th	45°.....	On	7th	—39°
February.....	"	28th	40°.....	"	12th	—34°
March.....	"	29th	43°.....	"	24th	—15°
April.....	"	26th	74°.....	"	8th	17°
May.....	"	29th	87°.....	"	8th & 18th	23°
June.....	"	11th	93°.....	"	5th	33°
July.....	"	16th	100°.....	"	3rd	40°
August.....	"	21 & 25th	97°.....	"	14th, 23rd, 29th	40°
September.....	"	12th	88°.....	"	29th	19°
October.....	"	15th	71°.....	"	29th	17°

AVERAGE TEMPERATURE FOR GROWING SEASON, APRIL 1 TO AUGUST 31.

Month.	Monthly Average.	
April.....	40·5°	} Daily Average, 58°.
May.....	51·5°	
June.....	61°	
July.....	70°	
August.....	67°	

RANGE OF TEMPERATURE.
Growing Season—April 1 to Aug. 31.

Month.	Date.	Greatest Daily Range		Degrees.	Average Daily Range
		From	To		
April.....	22	68°	21°	47°	21°
May.....	23	78°	30°	48°	29°
June.....	6	87°	36°	51°	32°
July.....	14 and 24	90°	45°	45°	34°
August.....	6	93°	45°	45°	31°

Average range (season), 29°·4.

SUNSHINE.

Hours of bright sunshine from April 1 to August 31, 1894, and number of days in which there was no sunshine.

Month.	Hours.	Month.	No. of Days.
<i>Sunshine.</i>		<i>No sunshine.</i>	
April.....	120·6	April.....	11
May.....	214·1	May.....	6
June.....	257·1	June.....	2
July.....	301	July.....	0
August.....	200	August.....	5
Total.....	1,092·8	Total.....	24

Greatest number of hours sunshine in any one day, 14·5 hrs., on July 1st.
Average daily for the five months, 7 hrs. 8¼ min.

RAINFALL.

From April 1st to August 31st, 1894, rain fell on ten days as follows:—

Month.	No. of Days.	Inches.
April.....	3	1·2
May.....	1	·3
June.....	2	·8
July.....	2	·57
August.....	2	1·03
Total.....	10	3·9

Greatest rain fall at any one time, on August 9th, 0·83 inches.

WIND.

The prevailing wind was north-west.

I have the honour to remain, sir,
Your obedient servant,
ANGUS MACKAY,
Superintendent



View on Experimental Farm, Agassiz, B. C., 1894, showing grain and apple-trees, in fruit ; planted, 1890.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B. C., 30th November, 1894.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my report for 1894, being the sixth annual report of the work done on the Experimental Farm at Agassiz.

The season just passed has been a most trying one for the farmers in this province.

The winter although not a severe one, was very wet, and the cold rainy, cloudy weather, continued nearly to the middle of June.

Up to this time, owing to the cold and wet, vegetation had not made as rapid progress as usual, but with the coming of warm sunshiny weather, there was promise of abundant crops, of the most important grains, roots, etc. The weather in the interior had been cold in the spring, and as a consequence of this, the snows had not melted to any considerable extent on the mountains, until late in May. Then the weather became unusually warm and clear, and the rapidly melting snow brought such an unusual supply of water from all its tributaries that the Frazer River rose to a height never before experienced, since the settlement of the country. The land in many important agricultural districts was overflowed, destroying crops, and carrying off bridges, fences, and in some cases buildings and cattle.

The experimental farm was not overflowed, but a portion of the Canadian Pacific Railway dump across the upper end of the Maria slough was washed out, filling that water course full, and overflowing a large portion of the lands south of the experimental farm, and on account of the coarse gravelly subsoil the water rose from below, and filling the soil, filtered through to the surface on all low spots, and small patches on the farm were covered with water in this way.

A number of the experimental plots of grain, roots and vegetables, were more or less injured, but fortunately, very little damage was sustained by the fruit trees, although a few of the pear and apple trees, stood in water for eight days, they do not show any appearance of injury on that account, and have since made a strong growth.

On the whole the season has been an average one on the experimental farm. The grain crops, where not injured by water, have been fair, the roots good, and apples and plums a good crop.

Although we are not troubled with early autumn frosts in British Columbia, yet it is just as advantageous, and as necessary, to sow grain as early in spring as is practicable, as it is in the Territories where early frosts are feared. The weather in the coast region of British Columbia in the latter part of the summer is mild, and the ripening of grain is not hurried forward, and in consequence the harvesting of late sown grain, is likely to be delayed, and the crop injured by rains.

The rains and chilly weather in the spring sometimes prevent the perfect fertilization or development of the blossoms, of some varieties of fruits, and on this account the crop is sometimes thus diminished.

About twenty acres of new land has been ploughed for the first time this year, and part of it has been planted out in apple trees, and about six acres more have been grubbed and is nearly ready for the plough.

The large field which has been used for a pasture, has been partially cleared of brush, and fallen timber, and sown with mixed grass seeds, and thus the pasture has been greatly improved. The seed has made a good catch, and will, I trust, give good feed next year.

A tank of 20,000 gallons has been put up on the mountain, for the purpose of supplying the stock and buildings, with pure spring water. This will be a great boon and prove very convenient for watering the stock at the stables, and will be a safe guard in case of accident by fire.

At the time of your annual visit of inspection, the cattle on the farm were tested with tuberculin, and five head which when tested showed symptoms of the disease slaughtered, all of which, were on examination found to be affected with tuberculosis. The balance of the herd, consisting of two Shorthorns, five Ayrshires, three Holsteins and two grades, are in good health and condition.

The Berkshire sow had a litter of nine fine pigs, two of which,—one boar and one sow—have been sold for breeders.

Both Dorset ewes had lambs last spring, but all were bucks. One of this year's and last year's were sold to breeders, and two are on hand yet. One of the ewes died during the summer.

One of the horses was ailing last spring and was at one time thought to be in a dangerous condition, with careful treatment he has recovered and is now all right. The other horses are and have been in good health and condition.

The material is on hand for a new poultry house, which it is expected will be built this winter, when the chickens will have better protection. With the present imperfect accommodations they have been exposed to depredations by hawks, skunks, minks and rats, which have caused the loss of quite a number of them. In spring several settings of eggs of different breeds were received from the Central Experimental Farm, but owing to delays or careless handling on the way, none of them hatched out.

The Osage orange and Arbor-vitæ hedges have made very satisfactory growth this year, but the Osage orange continues growing so late in the fall, that the wood does not ripen, and the ends of the branches kill back considerably every winter.

The rows of sample hedges of ornamental and flowering shrubs and evergreens have all made a fine growth and look well.

The avenue and shelter belt trees have done extremely well, and are very satisfactory, with the exception of the elm, these grow so rapidly, and carry such a weight of foliage, that from time to time during the summer, large limbs split off, injuring the appearance of the trees.

The shrubs planted on the lawn, and about the buildings, have grown well, and the flowering varieties produced a constant succession of bloom from early spring until frost in the fall.

The splendid collection of seeds and bulbs sent from the Central Experimental Farm, together with the collection of considerably over one hundred and fifty varieties of roses, and other flowering shrubs on the farm, gave a beautiful and abundant supply of flowers from early spring up to the present date, there being pansies now in bloom in the garden.

There is a continual and increasing interest taken in the farm by people, not only in this province, but in other provinces of the Dominion, many letters of inquiry are also received from the United States, Great Britain and other countries, and we have had many visitors.

The August meeting of the British Columbia Fruit Growers Association was held at Agassiz, which was attended by several hundred people, and papers of interest to horticulturists were read. There is a prospect of the summer meeting of the same society being held here next season.

In October we had the honour of a visit from His Excellency the Governor General of Canada. His Excellency was unfortunate in the weather, it being wet during his

visit, as it was on the occasion of his previous visit in 1891. The rain, however, did not prevent him from going through the orchards, and it was encouraging to hear his kindly words of commendation on the progress made since 1891.

EXPERIMENTS WITH FALL WHEAT.

TEST OF VARIETIES—Sown in plots of $\frac{1}{20}$ th acre each.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Proportion Rust.
				Inches.		Inches.		Bush. Lbs.	
Willits.....	Nov. 2	Aug. 17	289	36 to 42	Stiff and bright.	2 to 3 $\frac{1}{2}$	Bald white chaff.	19 1	No smut.
Stewart	" 2	" 17	289	42 to 48	"	2 to 4	"	22 29	"
Johnson.....	" 2	" 19	291	30 to 36	"	2 to 4	Bearded white chaff.	22 4	"
Canadian Velvet Chaff.	" 2	" 22	294	30 to 36	"	2 to 4	Bald white chaff.	13 20	Baldly winter-killed, no smut.
Democrat.....	" 2	" 17	289	42 to 54	"	2 $\frac{1}{2}$ to 3	Bearded white chaff.	19 7 $\frac{1}{2}$	"
Manchester.....	" 2	" 8	280	36 to 48	"	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	Slightly bearded red chaff.	23 52 $\frac{1}{2}$	Winter-killed, stooled well, no smut.
Early Red Clawson	" 2	" 24	296	42 to 48	"	3 to 4	Bald red chaff.	27 13 $\frac{1}{2}$	
Martin's Amber...	" 2	" 29	301	30 to 36	"	2 to 3	Slightly bearded white chaff.	14 48	
Royal Prize Red..	" 2	" 15	287	42 to 48	"	2 $\frac{1}{2}$ to 3	Bald red chaff.	22 3	Partly winter-killed.
Tasmania	" 2	" 16	288	36 to 42	"	2 to 3	Bearded red chaff.	23 13	
Golden Cross,....	" 2	" 14	286	52 to 60	"	2 to 3	"	23 7	
Carter's K.....	" 2	" 14	286	36 to 48	"	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	Bald white chaff.	26 20	
Carter's E	" 2	" 17	289	36 to 42	"	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	"	21 10 $\frac{1}{2}$	Badly winter-killed.
Square Head.....	" 2	" 24	296	36 to 42	"	2 to 3	"	22 9 $\frac{1}{2}$	
White Queen	" 2	" 18	290	24 to 48	"	1 $\frac{1}{2}$ to 4 $\frac{1}{2}$	"	20 12	Uneven growth.
Carter's C.....	" 2	" 18	290	36 to 42	Weak...	2 to 3	Bald red chaff.	19 38	
Carter's B.....	" 2	" 15	287	30 to 48	Stiff and bright.	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	Bald white chaff.	20 38	Considerable smut.
Carter's F.....	" 2	" 11	283	42 to 48	"	3 to 4	"	21 36	
Carter's G.....	" 2	" 20	292	36 to 42	"	3 to 3 $\frac{1}{2}$	"	20 2	
Carter's A.....	" 2	" 15	287	36 to 42	"	2 $\frac{1}{2}$ to 4	Bald red chaff.	14 14	Some smut.
Carter's D.....	" 2	" 15	287	48 to 52	"	3 to 4	.....	22 15 $\frac{1}{4}$	
Carter's J.....	" 2	" 15	287	42 to 48	Long & slender	3 to 4	Bald white chaff.	15 46	
Carter's H.....	" 2	" 17	289	48 to 52	Weak & slender	3 to 4	"	30 56	
Volunteer	" 2	" 17	289	36 to 48	Stiff and bright.	2 to 2 $\frac{1}{2}$	Bearded red chaff.	20 44 $\frac{1}{2}$	
Fill Measure.....	" 2	" 18	290	.....	Soft and crinkled down.	.....	Bald white chaff.	29 36	

EXPERIMENTS WITH SPRING WHEAT.
TEST OF VARIETIES.—All sown on plots of $\frac{1}{20}$ th acre each.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.		Length of Head.	Kind of Head.	Yield per Acre.		Remarks.
				Inch.	Inch.	Inch.		Bush.	Lbs.	
White Fife.....	April 25	Aug. 17	114	30	36	2 2½	Beardless.	24	45	Stooled very well. Heads plump and well filled.
Cross-bred. Red Fife with Club Bombay, plant 1.	" 25	" 21	118	36	42	2½ 4	Bearded at tip.	23	55	Stooled well. Heads compact plump and well filled.
Campbell's White Chaff	" 25	" 14	111	36	45	3 3½	Beardless.	22	10	Heads open but very plump.
Progress	" 25	" 21	118	42	48	3 4	" ..	21	10	Heads open, but plump and well filled to tip.
Preston.....	" 25	" 18	115	30	36	2 2½	Bearded..	20	50	Heads short, but very plump and well filled.
Cross-bred. Ladoga with White Fife.	" 25	" 21	118	24	42	2 3½	" ..	20	40	Straw uneven. Heads compact and well filled to tip.
Abundance.....	" 25	" 14	111	36	45	2½ 3½	" ..	20	30	Did not stool well. Heads compact and well filled.
Cross-bred. Ladoga with White Fife.	" 25	" 21	118	30	42	2 3½	Beardless.	20	10	Straw clean and bright. Head well filled but not compact.
Crown.....	" 25	" 16	113	30	36	2½ 3	Bearded..	19	50	Heads open, but plump and well filled.
Cross-bred. Red Fife with Ladoga, plant 2	" 25	" 21	118	30	42	2 3	Bearded at tip.	19	50	Stooled well. Heads open, not well filled to tip.
Rio Grande.....	" 25	" 21	118	36	48	3½ 4	Bearded..	19	20	Medium stand. Did not stool. Heads open but very plump.
Wellman's Fife.....	" 25	" 21	118	24	36	2 2½	Beardless.	19	20	Heads compact, but not well filled.
Beauty....	" 25	" 21	118	30	36	2 3	Slightly bearded at tip.	18	50	Stooled fairly. Heads open and not plump.
Cross-bred. Ladoga with White Fife, (sport).	" 25	" 17	114	36	42	2 3	Slightly bearded at tip.	18	30	Straw bright and clean. Heads compact and well filled to tip.
Stanley	" 25	" 16	113	30	36	2 3	Beardless.	18	20	Heads open, but fairly plump.
Alpha.....	" 25	" 18	115	30	36	2 3	" ..	18	15	Stooled well. Heads compact but not well filled.
Advance.....	" 25	" 17	114	24	42	2½ 3½	Bearded..	17	55	Uneven crop. Heads compact and fairly plump.
Rideau.....	" 25	" 21	118	30	36	2 3	Beardless.	17	40	Heads compact, plump and well filled to tip.
Red Fife.....	" 25	" 21	118	30	42	2 2½	" ..	17	25	Heads compact but not plump.
Bearded Alpha.....	" 25	" 21	118	36	42	2 3½	Bearded..	17	20	Stooled well. Heads slender, not well filled.
Huron	" 25	" 17	114	24	36	2 3½	" ..	17	10	Straw weak. Heads open, well filled to tip.
Pringle's Champlain ..	" 25	" 16	113	24	30	2 2½	" ..	17	10	Did not stool well. Heads open but well filled.
Cross-bred. Spiti Valley with Red Fife, plant 2.	" 25	" 21	118	24	30	2½ 3	Beardless.	16	45	Did not stool well. Heads compact and plump.
Percy	" 25	" 16	113	18	24	2 2½	" ..	15	55	Heads short, but plump and compact.
White Connell.....	" 25	" 21	118	24	36	2 2½	" ..	15	50	A thin stand and poor heads.
Gehun....	" 25	" 14	111	24	36	2 2½	" ..	14	30	Did not stool well. Heads open, not well filled.
Cross-bred. Red Fife with Ladoga, plant 3	" 25	" 21	118	24	36	2 3	" ..	14	25	Did not stool well. Heads compact but not plump.
Herisson Bearded.....	" 25	" 21	118	18	24	1 2½	Bearded ..	13	55	Straw short. Did not stool well. Heads short but plump.
Dion's.....	" 25	" 17	114	24	30	2 2½	" ..	13	5	Heads open, but plump and well filled.
Ladoga.....	" 25	" 14	111	30	42	1½ 2½	" ..	12	15	Straw weak. Heads not well filled.
Dufferin.....	" 25	" 22	119	24	36	2½ 3	" ..	10	25	Did not stool well. Heads slender, not well filled.

EXPERIMENTS WITH BARLEY.

TWO-ROWED SORTS.

The ground for these plots had been given a dressing of stable manure, and had been well prepared, but when the high water came in June, the land—although not overflowed—became so wet that the plots were very seriously injured, some of them being nearly killed out.

Those showing the best results were on plots where the land was a little the highest, and consequently did not suffer so much. The results this season cannot be taken as a satisfactory test of the relative productiveness of the different varieties.

TEST OF VARIETIES—On plots of $\frac{1}{20}$ th acre each.

Name of Variety.	Sown.	Up.	Headed out.	Ripe.	Length of Straw.	Number of days to Mature.	Yield per Acre.
					Feet.		Bush. Lbs.
California Prolific.....	April 23..	May 3..	July 2..	Augt. 10..	2 to 2 $\frac{1}{2}$	109	37 4
Duckbill.....	" 23..	" 7..	" 3..	" 10..	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	109	30 20
Goldthorpe.....	" 23..	" 7..	" 8..	" 13..	2 to 2 $\frac{1}{2}$	112	29 43
New Golden Grains.....	" 23..	" 7..	" 6..	" 11..	2 to 2 $\frac{1}{2}$	111	29 38
Newton.....	" 23..	" 6..	" 5..	" 13..	2 to 2 $\frac{1}{2}$	112	28 41
Canadian Thorpe.....	" 23..	" 7..	" 4..	" 11..	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	110	27 14
Beaver.....	" 23..	" 4..	" 4..	" 10..	1 to 1 $\frac{1}{2}$	109	23 41
French Chevalier.....	" 23..	" 7..	" 7..	" 11..	1 $\frac{1}{2}$ to 2	110	22 44
Improved Chevalier.....	" 23..	" 7..	" 9..	" 10..	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	109	21 7
Prize Prolific.....	" 23..	" 7..	" 9..	" 16..	1 to 2	115	18 31
Kinver Chevalier.....	" 23..	" 7..	" 9..	" 13..	1 to 2	112	18 16
Thanet.....	" 23..	" 7..	" 7..	" 10..	1 to 1 $\frac{1}{2}$	109	12 4

SIX-ROWED SORTS.

These plots were also very much injured by water, and the results obtained under such circumstances cannot be taken as correctly indicating the relative productiveness of the different sorts. The soil chosen for this test was a sandy loam.

TEST OF VARIETIES—On plots of $\frac{1}{20}$ th acre each.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.
				Inches.		Inches.	Bush. Lbs.
Odessa.....	April 23..	July 31..	98	24 to 30	Br't & stiff	2 to 3	31 12
Oderbruch.....	" 23..	Aug. 1..	99	24 to 30	Fair l'ngth	1 $\frac{1}{2}$ to 3	20 —
Baxter's.....	" 23..	" 1..	99	24	Br't & stiff	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	18 16
Royal.....	" 23..	" 3..	101	18 to 24	Short.....	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	17 4
Petschora.....	" 23..	" 1..	99	18 to 24	"	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	16 32
Common six-rowed.....	" 23..	" 2..	100	12 to 24	"	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	16 7
Phoenix.....	" 23..	" 2..	100	18 to 24	"	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	15 00
Rennie's Improved.....	" 23..	" 2..	100	18 to 24	"	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	11 12

EXPERIMENTS WITH OATS.

Thirty-seven varieties of oats were tested. They were sown on loamy soil, on plots of $\frac{1}{20}$ th of an acre each. The very wet condition of the ground in June interfered with the healthy growth of the grain and lessened the yield, especially on those plots where the land was lowest.

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Proportion Rusted.
				Inches.		Inches.		Bush. Lbs.	
Abundance....	April 30	Aug. 20	112	36 to 54.	Stiff.....	6 to 10.	Branching	49 24	Considerably.
Early Gothland...	" 30	" 18	110	36 to 54.	Stiff.....	6 to 12.	Half sided	46 26	Very slightly.
White Wonder...	" 30	" 18	110	48 to 54.	Stiff.....	8 to 12.	Branching	43 33	None.
Improved Ligowo.	" 30	" 20	112	36 to 48.	Stiff.....	6 to 8.	"	42 27	"
Early Blossom....	" 30	" 10	101	36 to 42.	Weak.....	7 to 10.	Sided.....	41 11	Considerably.
Prize Cluster.....	" 30	" 20	112	42 to 54.	Stiff.....	6 to 10.	Branching	40 10	Slightly.
Banner.....	" 30	" 20	112	36 to 48.	Stiff.....	6 to 10.	"	40 8	None.
Welcome.....	" 30	" 20	112	36 to 48.	Weak.....	6 to 10.	"	39 24	Considerably.
Cream Egyptian..	" 30	" 18	110	42 to 48.	Stiff.....	6 to 10.	"	38 28	None.
Poland White....	" 30	" 20	112	42 to 48.	Stiff.....	7 to 10.	"	38 8	"
Golden Beauty....	" 30	" 19	111	30 to 42.	Weak.....	6 to 10.	"	38 8	Considerably.
Lincoln.....	" 30	" 24	116	36 to 48.	Stiff.....	6 to 10.	"	37 12	"
Joanette.....	" 30	" 20	112	24 to 30.	Short....	8 to 12.	"	37 12	Slightly.
Bavarian.....	" 30	" 25	117	30 to 42.	Stiff.....	5 to 10.	"	36 31	Very slightly.
Flying Scotchman.	" 30	" 18	110	36 to 48.	Stiff.....	6 to 10.	"	35 15	Considerably.
Holstein Prolific..	" 30	" 20	112	24 to 36.	Weak.....	6 to 8.	"	35 11	Slightly.
White Russian....	" 30	" 20	112	30 to 48.	Weak.....	4 to 10.	Sided.....	35 10	Badly.
Early Etampes...	" 30	" 19	111	24 to 30.	Weak....	6 to 10.	Branching	35 5	None.
Golden Giant.....	" 30	" 25	117	24 to 42.	Stiff.....	6 to 12.	"	35 00	"
Oderbruch.....	" 30	" 19	111	42 to 54.	Weak.....	6 to 10.	Half sided	35 00	Very slightly.
Early Archangel..	" 30	" 20	112	24 to 36.	Stiff.....	6 to 10.	Branching	34 24	Considerably.
Giant Cluster....	" 30	" 24	116	24 to 36.	Stiff.....	4 to 8.	"	34 19	Slightly.
Prolific Black Tar- tarian.	" 30	" 18	110	24 to 30.	Weak....	6 to 10.	Sided.....	33 28	None.
Bonanza.....	" 30	" 20	112	42 to 48.	Stiff.....	6 to 8.	Branching	33 23	Considerably.
Scottish Chief....	" 30	" 20	112	24 to 36.	Short....	6 to 8.	"	33 18	None.
Bl'ck Coulommiers	" 30	" 24	116	30 to 42.	Stiff.....	5 to 10.	"	33 13	Considerably.
Doncaster Prize...	" 30	" 20	112	24 to 42.	Stiff.....	5 to 9.	"	32 32	"
Abyssinia.....	" 30	" 19	111	42 to 48.	Stiff.....	6 to 10.	"	32 12	None.
Rosedale.....	" 30	" 20	112	24 to 36.	Stiff.....	5 to 9.	Half sided	31 11	Injured by water.
Prolific Black Cali- fornian.	" 30	" 24	116	24 to 30.	Short.....	6 to 8.	Sided.....	31 11	Considerably.
Wallis.....	" 30	" 25	117	24 to 36.	Stiff....	6 to 12.	Branching	29 29	"
Columbus.....	" 30	" 20	112	30 to 36.	Stiff.....	6 to 8.	"	29 9	Slightly.
Rennie's Prize White.	" 30	" 18	110	36 to 42.	Stiff.....	6 to 8.	"	28 8	None.
Siberian.....	" 30	" 24	116	30 to 36.	Stiff.....	4 to 8.	Sided.....	25 1	"
Schonen.....	May 18	" 25	99	24 to 27.	Weak....	6 to 8.	Branching	24 9	"
American Triumph	April 30	" 21	113	24 to 30.	Soft....	4 to 8.	"	23 33	Very slightly.
White Monarch...	" 30	" 27	119	24 to 36.	Stiff.....	6 to 9.	"	23 8	Considerably.

OATS—RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These were sown on plots of $\frac{1}{10}$ acre each. There was no smut or rust, but the yield was much injured in all these plots by the high water. Where late plots have shown a proportionately larger yield, it has been because the land on which those plots happened to be was a little higher than others. All suffered from the water, but some less than others. Every year's experience confirms the opinion that, owing to the difficulty in harvesting late sown grain, on account of showery weather, it is very important to get grain sown here as early in spring as the ground can be prepared.

Name of Variety.	Sown.	Up.	Headed out.	Ripe.	Length of Straw.	No. of days to Ripen.	Yield per Acre.		Remarks.
					Feet.		Bush.	Lbs.	
Abundance, Plot No. 1.	April 24..	May 7..	July 9..	Aug. 17..	2 $\frac{3}{4}$ to 3 $\frac{1}{2}$	115	41	6	No smut or rust.
" " 2.	May 1..	" 13..	" 13..	" 22..	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	113	38	3	
" " 3.	" 8..	" 18..	" 14..	" 22..	2 to 3	106	41	16	
" " 4.	" 15..	" 22..	" 16..	" 25..	2 to 3	102	32	7	
" " 5.	" 22..	" 27..	" 22..	" 27..	3 to 3 $\frac{1}{2}$	97	35	20	
" " 6.	" 29..	June 5..	" 30..	" 29..	3 to 4	92	41	6	
Banner, Plot No. 1....	April 24..	May 7..	July 13..	Aug. 17..	2 $\frac{1}{2}$ to 3	115	43	8	
" " 2....	May 1..	" 13..	" 16..	" 20..	2 to 3	111	48	18	
" " 3....	" 8..	" 13..	" 20..	" 25..	2 to 3	109	42	27	
" " 4....	" 15..	" 23..	" 24..	" 27..	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	104	32	32	
" " 5....	" 22..	" 27..	" 27..	" 28..	1 $\frac{1}{2}$ to 3 $\frac{1}{2}$	98	31	31	
" " 6....	" 29..	June 5..	" 29..	" 30..	2 $\frac{1}{2}$ to 3	92	47	22	

WHEAT—RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These plots also suffered from high water, the water oozing through to the surface and remaining, from one to six inches deep, for several days in June, killing the crop in the lowest part of the plots. There was no rust or smut. These plots were all $\frac{1}{10}$ acre each.

Name of Variety.	Sown.	Up.	Headed out.	Ripe.	Length of Head.	Length of Straw.	No. of days to Ripen.	Yield per Acre.	
					Inches.	Feet.		Bush.	Lbs.
Stanley, Plot No. 1....	April 24..	May 8..	July 4..	Aug. 16..	2 to 3	2 to 3	114	9	50
" " 2....	May 1..	" 14..	" 7..	" 16..	2 to 3	2 to 3	107	16	25
" " 3....	" 8..	" 17..	" 9..	" 18..	2 to 3	2 to 3	102	14	00
" " 4....	" 15..	" 21..	" 12..	" 22..	2 to 3	2 to 3	99	13	5
" " 5....	" 22..	" 27..	" 15..	" 25..	1 $\frac{1}{2}$ to 2	2 to 2 $\frac{1}{2}$	95	13	20
" " 6....	" 29..	June 4..	" 19..	" 28..	1 to 1 $\frac{1}{2}$	1 $\frac{1}{2}$ to 2	91	9	20
Red Fife, Plot No. 1...	April 24..	May 8..	July 7..	Aug. 18..	1 to 1 $\frac{1}{2}$	2 to 2 $\frac{1}{2}$	116	11	5
" " 2...	May 1..	" 14..	" 9..	" 22..	2 to 2 $\frac{1}{2}$	2 to 2 $\frac{1}{2}$	113	10	50
" " 3...	" 8..	" 18..	" 12..	" 25..	1 $\frac{1}{2}$ to 2	2 to 2 $\frac{1}{2}$	109	11	10
" " 4...	" 15..	" 22..	" 16..	" 27..	1 $\frac{1}{2}$ to 2	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	104	15	00
" " 5...	" 22..	" 26..	" 20..	" 29..	1 $\frac{1}{2}$ to 2	1 $\frac{1}{2}$ to 2	99	14	35
" " 6...	" 29..	June 3..	" 23..	Sept. 1..	1 to 1 $\frac{1}{2}$	1 to 2	94	7	40

BARLEY, RESULTS OF EARLY, MEDIUM AND LATE SOWING.

The barley plots for this test, were sown along side of the plots of barley for the comparative test of varieties, and suffered also from water. Plots 1, 2 and 6 were a little higher than 3, 4 and 5, and on this account gave better yields. The size of the plots was $\frac{1}{10}$ of an acre each. The grain did not suffer from rust or smut. The varieties chosen for the test were Canadian Thorpe a two-rowed sort and Oderbruch a six-rowed variety.

Name of Variety.	Sown.	Up.	Headed out.	Ripe.	Length of Straw.	Number of days to Mature.	Yield per Acre.
					Feet.		Bush. Lbs.
Canadian Thorpe, Plot No. 1	April 24..	May 6..	July 4..	Aug. 10..	1½ to 2	108	16 2
" " " 2	May 1..	" 14..	July 8..	" 16..	1 to 1½	107	13 1
" " " 3	" 8..	" 16..	" 14..	" 18..	1 to 2	102	7 39
" " " 4	" 15..	" 22..	" 17..	" 22..	1 to 2	99	8 26
" " " 5	" 22..	" 27..	" 21..	" 25..	1 to 2	95	6 42
" " " 6	" 29..	June 4..	" 24..	" 28..	1½ to 2	91	13 26
Oderbruch, Plot No. 1	April 24..	May 7..	June 28..	July 31..	1 to 1½	98	6 42
" " 2	May 1..	" 14..	July 2..	Aug. 2..	1½ to 2	93	17 24
" " 3	" 8..	" 16..	" 6..	" 3..	1½ to 2	87	18 32
" " 4	" 15..	" 20..	" 9..	" 6..	1 to 1½	83	14 8
" " 5	" 22..	" 27..	" 12..	" 13..	1½ to 2	83	20 20
" " 6	" 29..	June 4..	" 14..	" 13..	1 to 1½	82	9 23

FIELD PEASE ON PLOTS OF $\frac{1}{20}$ OF AN ACRE EACH.

Name of Variety.	Seed per Acre.	Sown.	Up.	In Blossom.	Ripe.	Length of Staw.	No. of Days to Mature.	Yield per Acre.	Remarks.
	Lbs					Ft.		Bus. lbs.	
Golden Vine.....	150	April 18	May 3	July 6	Augt 14	3 to 4½	118	42	Vines very well loaded with long well filled pods.
Crown.....	150	" 18	" 4	" 4	" 14	3 to 3¼	118	39 5..	Vines well loaded, and pods filled out.
Centennial.....	180	" 18	" 4	" 2	" 16	2½ to 4	120	39	Straw well furnished with long well filled pods.
White Marrowfat....	210	" 18	" 3	" 7	" 14	3 to 3½	118	37 35..	Vines well loaded, pods long and well filled.
Multiplier.....	150	" 18	" 1	" 7	" 12	3 to 3½	116	37	Vines well furnished with well filled pods.
Pride.....	180	" 18	" 3	" 4	" 9	2½ to 3	113	36 40..	Vines well loaded with well filled pods.
New Potter.....	150	" 18	" 4	" 6	" 16	3½ to 4	120	34 25..	Vines well loaded with well filled pods.
Canadian Beauty	200	" 18	" 3	" 6	" 16	2½ to 3	120	31 40..	Vines well loaded, pods short.
Mummy	180	" 18	" 2	" 3	" 15	2½ to 3½	119	31 20..	Vines very well loaded with pods which were not well filled.
Prince Albert.....	150	" 18	" 1	" 9	" 16	3½ to 5	120	31	Vines not very well furnished, pods long and well filled.
Black Eyed Marrowfat.	210	" 18	" 3	" 3	" 14	3 to 3½	118	29 55..	Pod long and filled out to the end.
Prussian Blue.....	150	" 18	" 2	" 8	" 14	2½ to 4	118	29 55..	Vines well loaded, pods short.



View in Hop-yard, near Agassiz, B.C.

GREEN FEED.

Two plots of $\frac{1}{10}$ of an acre each, were sown with mixed grain for the purpose of cutting green, and curing as hay, with the following results.

Mixture No. 1.—6 lbs. of Golden Vine Pease, 5 lbs. of Prize Prolific barley, and $3\frac{1}{2}$ lbs. of Banner oats, mixed and sown together on $\frac{1}{10}$ acre plot equal to 1 bushel of each per acre. Sown April 17, up May 4, cut July 27. Barley in early dough, oats in milk, and Pease about fit for table use. Weight when cut 1,550 lbs.; weight when thoroughly cured 650 lbs., making 7 tons 1,500 lbs. green and 3 tons 500 lbs. cured fodder per acre.

Mixture No. 2.—6 lbs. Golden Vine Pease, 5 lbs. Red Fife Wheat, $3\frac{1}{2}$ lbs. Banner Oats, cut when oats and wheat were in milk, and pease were a little too hard for table use. Plot $\frac{1}{10}$ acre, weight when cut 1,925 lbs., when cured 750 lbs., or at the rate of 9 tons, 1,250 lbs. per acre green and 3 tons 1,500 lbs. when cured.

The plots were sown side by side, soil and treatment the same, showing rather better results this year than last, mixture No. 2 being somewhat the heaviest. Last year No. 2 was a little the lightest. Both years, the stock appeared to like this feed very much, and milking cows gave more milk while feeding on it, than on grass similarly cured.

HYBRIDIZING.

The hybrid grains mentioned in my last report have been sown and harvested this year, and some of them, especially the barleys and pease, are very promising, some of the former being over four feet high with very fine heads, and bright stiff straw. They sported a great deal, but they were carefully harvested and the most promising varieties kept separate for future sowing, with a good prospect of useful results.

Out of a number of potato seedlings, twenty four were chosen and planted in 1893. These have been reduced to six, selecting the most promising to try again.

A little hybridizing was done with grain this year, and those produced last year were sown, with, in most cases, satisfactory returns.

Some efforts have also been made, in the way of producing new varieties of fruits by cross fertilization.

HOPS.

A small experimental yard of hops has been started. A hundred roots of the Kentish Golding, having been procured from Capt. Moore of this place, and a hundred of the California Cluster from Mr. Meeker of Puyallup, Washington Territory.

The roots received from Capt. Moore were exceptionally fine, and have made a very fine growth. The others too, have done well, and will be poled next season when a crop may be expected.

The hop crop in British Columbia has been a medium one, and some very superior samples have been put up in this neighbourhood but prices have been low, owing to extensive plantations in other countries, and heavy yields.

Hop growers have perhaps not suffered in this respect, more than other producers, and they have many reasons to feel hopeful for the future. The soil and climate in many parts of British Columbia have proved to be favourable to the production of large yields of hops of a superior quality.

TURNIPS.

Twelve varieties of turnips were tested on land that had been in hoed crops the previous year, and was manured in the spring with a light dressing of stable manure.

Two sowings of each variety were made in rows 30 inches apart, and the plants thinned to 6 inches in the rows. These plots were above high water, and the turnips were very good.

The Elephant and Rennie's Prize Purple Top, are, as in previous years, the finest shaped and best turnips we have tested here.

TURNIPS.

Name of Variety.	Sown.		Up.		Harvested	Yield per Acre.		Yield per Acre.	
						Tons.	Lbs.	Bush.	Lbs.
Skirvings Champion, 1st sowing.....	May	17..	May	27..	Nov. 13..	20	1,184	693	40
Skirvings Champion, 2nd sowing.....	"	31..	June	4..	" 13..	18	1,620	627	00
Elephant, 1st sowing.....	"	17..	May	27..	" 13..	21	1,560	726	00
Elephant, 2nd sowing.....	"	31..	June	4..	" 13..	23	992	783	12
Rennie's Prize Purple Top, 1st sowing...	"	17..	May	27..	" 13..	20	40	667	20
Rennie's Prize Purple Top, 2nd sowing...	"	31..	June	5..	" 13..	24	136	802	16
East Lothian Purple Top, 1st sowing.....	"	17..	May	27..	" 13..	23	1,608	793	28
East Lothian Purple Top, 2nd sowing....	"	31..	June	4..	" 13..	23	992	783	12
Marquis of Lorne, 1st sowing.....	"	18..	May	28..	" 13..	21	1,560	726	00
Marquis of Lorne, 2nd sowing.....	June	1..	June	7..	" 13..	27	1,704	928	24
Carter's Elephant, 1st sowing.....	May	18..	May	28..	" 13..	25	1,920	865	20
Carter's Elephant, 2nd sowing.....	June	1..	June	6..	" 13..	25	1,744	862	24
Jumbo, 1st sowing.....	May	18..	May	27..	" 13..	33	12	1,101	42
Jumbo, 2nd sowing.....	June	1..	June	6..	" 13..	24	488	808	08
Westbury Improved, 1st sowing.....	May	18..	May	26..	" 13..	23	728	778	48
Westbury Improved, 2nd sowing.....	June	1..	June	6..	" 13..	21	272	704	32
Selected Purple Top, 1st sowing.....	May	18..	May	26..	" 13..	27	800	913	20
Selected Purple Top, 2nd sowing.....	June	1..	June	6..	" 13..	23	784	779	44
Skirvings, 1st sowing.....	May	18..	May	28..	" 14..	16	208	536	48
Skirvings, 2nd sowing.....	June	1..	June	7..	" 14..	10	1,384	356	24
Bloomsdale Swede, 1st sowing.....	May	18..	May	29..	" 14..	14	1,920	482	00
Bloomsdale Swede, 2nd sowing.....	June	1..	June	6..	" 14..	9	40	300	40
Landreth's Southern Snow, Globe turnips, 1st sowing.....	May	18..	May	28..	" 14..	8	1,424	290	24
Landreth's Southern Snow, Globe turnips, 2nd sowing.....	June	1..	June	5..	" 14..	8	808	280	8

This last named variety is a white turnip only fit for fall feeding.

MANGELS.

The soil for these tests had been dressed with barnyard manured the previous autumn, and was well prepared, but the yields are small on account of the high water in June, which injured some plots much more than others.

Eight varieties of mangels were tested. Two sowings of each variety were made, one April 22nd and the other two weeks later, they were sown 30 inches apart, and thinned to 6 inches in the row.

Name of Variety.	Sown.		Up.		Harvested.	Weight per Acre.		Weight per Acre.	
						Tons.	lbs.	Bush.	lbs.
Rennie's Mammoth Long Red, 1st.....	April	20..	May	2..	Nov. 14..	11	880	381	20
" " " " 2nd.....	May	4..	"	16..	" 14..	5	1340	189	..
Evan's Mammoth Long Red, 1st.....	April	20..	"	5..	" 14..	21	856	714	20
" " " " 2nd.....	May	4..	"	18..	" 14..	24	928	816	28
Rennie's Golden Tankard, 1st.....	April	20..	"	5..	" 14..	20	1360	689	20
" " " " 2nd.....	May	4..	"	18..	" 14..	17	1200	586	40
Mammoth Long Red Gatepost, 1st.....	April	20..	"	7..	" 14..	19	280	638	..
" " " " 2nd.....	May	4..	"	19..	" 14..	10	1120	352	..
Pearce's Canada Giant, 1st.....	April	20..	"	6..	" 14..	16	1352	555	52
" " " " 2nd.....	May	4..	"	18..	" 14..	16	1640	560	40
Improved Prize Long Red, 1st.....	April	20..	"	7..	" 14..	18	608	610	8
" " " " 2nd.....	May	4..	"	18..	" 14..	19	1600	660	..
Carter's Warden Orange Globe, 1st.....	April	20..	"	3..	" 14..	14	1480	491	20
" " " " 2nd.....	May	4..	"	17..	" 14..	14	424	473	44
Giant Yellow Intermediate 1st.....	April	20..	"	7..	" 14..	27	1352	922	32
" " " " 2nd.....	May	4..	"	21..	" 14..	18	256	604	16

CARROTS—TEST OF VARIETIES.

Name of variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.	Yield per Acre. 1st Plot.	Yield per Acre. 2nd Plot.	Yield per acre. 2nd Plot.
					Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
Mam. White Intermediate	April 21	May 5	Nov. 14	Nov. 14	20 810	680 10	17 1,750	595 50
Carter's Orange Giant....	" 21	" 5	" 14	" 14	20 810	680 10	13 1,170	452 50
Iverson's Champion.....	" 21	" 5	" 14	" 14	17 430	573 50	16 1,550	559 10
White Belgian.....	" 21	" 5	" 14	" 14	17 180	569 40	14 50	467 30
Half Long Scarlet Stump.	" 21	" 5	" 14	" 14	12 860	414 20	11 1,540	392 20
St. Valery.....	" 21	" 5	" 14	" 14	12 420	407 00	10 790	346 30
Pearce's Imp. Long White	" 23	" 7	" 14	" 14	101,780	363 00	7 550	242 30
Early Gem.....	" 23	" 7	" 14	" 14	9 260	304 20	8 1,380	289 40

SUGAR BEETS.

1 lb. each of the following sugar beet seeds were received, but were drowned out in June.

Klein Wanzleben, French Red Top, Vilmorin's Improved.

FIELD CORN.

A comparative test of nine varieties of field corn has been made, cut green for ensilage. These were grown both in rows and hills; and, as will be seen from the appended table, the yield varied very much, the rows generally giving a heavier crop than the hills. The plots were all on a loamy soil; the rows were three feet apart and the plants from 6 to 8 inches apart in the rows. The hills were planted three feet apart each way, with 3 or 4 plants in a hill. The yield in each case has been calculated from the weights obtained from two rows 66 feet long, and in the case of the hills from a similar area.

FIELD CORN—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per acre grown in rows.	Weight per acre grown in hills.
		Inch.							Tons. Lbs.	Tons. Lbs.
Livingston's Gold Coin.	Medium.	72to90	Average..	Aug. 24	Sept. 20	Oct. 1	.....	Early milk	14 1040	13 1500
Thoroughbred White Flint.	Vigorous	75to90	Very leafy	" 24	" 25	.....	.....	C'n formed	12 1300	11
Golden Medal Dent	Long and slender.	70to80	Average..	" 20	" 10	Oct. 1	.....	"	11 500	9 1700
Compton's Early..	Medium.	72to78	" ..	" 17	Aug. 28	Sept. 12	Sept. 20	Glazed. . .	10 900	9 760
Longfellow.....	Vigorous	72to78	Very leafy	" 16	" 28	" 20	" 30	Late milk.	8 1620	5 1200
Smut Nose.	Medium.	60to72	Not leafy.	" 19	" 24	Aug. 30	" 20	Early ears glazed.	8 1600	6 500
Angel of Midnight.	" ..	70to80	" ..	Sept. 4	Sept. 10	Sept. 30	.....	In early milk.	8 900	8 500
Pearce's Prolific...	Vigorous	60to66	Average..	Aug. 8	Aug. 16	" 9	Sept. 20	Corn well glazed.	5 1100	3 1700
Mitchell's Early...	Short and slender.	40to48	Not leafy.	" 5	" 10	Aug. 24	Aug. 30	Corn ripe.	4 1140	2 1500

Sown on May 31st. All flint varieties with exception of Gold Medal Dent.

CORN—GARDEN VARIETIES.

Name of Variety.	Date of Sowing.	Up.	Tasselled.	Fit for table.	Length of ear.	Remarks.
					Inches.	
Mitchell's Extra Early	May 29..	June 11..	July 13..	Aug. 8..	3½ to 5	Not a first class table corn, not sweet and it gets glazed and hard very quickly after being fit for table.
Dreer's First of all....	" 29..	" 12..	" 24..	" 14..	4 to 6	Cobs filled out with large kernels, remaining fit for table a long time, quality good.
Extra Early Vermont.	" 29..	" 11..	" 24..	" 16..	4 to 8	Cobs filled out with medium sized kernels of fair quality.
Cory.....	" 29..	" 11..	" 26..	" 26..	3½ to 6	Cobs well filled, kernels large, and very fine in quality, remaining fit for table a long time, one of the best table corns.

HORSE BEANS AND RUSSIAN SUNFLOWERS FOR ENSILAGE.

A quantity of Early Mazagan horse beans were sown in drills, 24 inches apart, for mixing with corn, and sunflower heads, for ensilage.

They matured fairly well and yielded at the rate of 2½ tons per acre.

The sunflower heads yielded at the rate of nearly 4½ tons per acre.

EXPERIMENTS WITH POTATOES.

Forty-six varieties of potatoes were tested side by side on a rich loamy soil in rows 2½ feet apart, with sets one foot apart in the rows. The season was not a good one for potatoes, the dry weather, which began in June and continued until the tubers were nearly full grown, very much reduced the yield especially of some varieties, the quality, however, is in most cases very good. The yields per acre have been calculated from the weight of the crop obtained from two rows each 66 feet long

POTATOES—TEST OF VARIETIES.

Name of Variety.	Planted.	Dug.	When Matured.	Quality.	Total Yield per Acre.	Yield per Acre of Sound.	Yield per Acre of Rotten.	Yield per Acre of Marketable.	Yield per Acre of Unmarketable.
					Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.
Late Puritan.....	May 19.	Oct. 15.	Oct. 5.	Damp & soft.	310 27	310 27	None.	247 00	63 30
World's Fair.....	" 19.	Sept. 28.	Sept. 25.	Poor.	282 20	265 30	16 50	238 30	27 00
Rural Blush.....	" 11.	Oct. 13.	Oct. 10.	Good.	244 45	244 45	None.	195 15	49 30
Holborn Abundance...	" 11.	" 11.	" 10.	Poor.	232 40	205 30	27 10	183 00	22 30
Green Mountain.....	" 9.	" 15.	Sept. 15.	Good.	220 00	220 00	None.	175 00	45 00
Toronto Queen.	" 9.	" 15.	" 16.	"	212 40	212 40	"	169 00	43 00
American Giant.....	" 11.	" 13.	Oct. 10.	Fair.....	196 55	187 15	9 40	151 15	36 00
Early Puritan.....	" 9.	" 1.	Sept. 20.	Good.	194 20	175 20	19 00	149 00	26 20
Burpee's Extra Early..	" 9.	" 1.	" 6.	"	183 40	183 40	None.	157 30	26 10
Vanier.....	" 11.	" 11.	" 15.	"	168 45	168 45	"	126 45	42 00
Sharpe's Seedling.....	" 9.	" 15.	" 10.	"	166 50	166 50	"	133 20	33 30
Delaware.....	" 11.	" 13.	" 25.	"	165 00	156 39	8 30	131 45	24 45
American Wonder....	" 19.	" 15.	Oct. 5.	"	158 50	158 50	None.	135 00	23 50
Early Ohio.....	" 11.	" 11.	Sept. 10.	"	152 10	152 10	"	121 00	31 10
Lee's Favourite.....	" 9.	" 1.	" 15.	"	150 20	150 20	"	132 00	18 20
New Variety No. 1....	" 10.	" 2.	" 6.	"	146 40	138 30	8 10	110 00	28 30
Pearce's Extra Early..	" 12.	" 11.	" 1.	"	145 45	145 45	None.	115 00	30 45
Daisy.....	" 10.	" 5.	" 6.	"	135 40	135 40	"	118 40	17 00
Dakota Red.....	" 9.	" 5.	" 15.	"	132 00	132 00	"	116 20	15 40
Wonder of the World..	" 11.	" 12.	" 10.	"	132 00	128 00	4 00	83 30	39 30
Monroe County.....	" 10.	" 5.	" 6.	"	124 40	124 40	None.	93 00	31 40
Pearce's Prize Winner.	" 11.	" 11.	" 15.	"	122 25	122 25	"	96 55	25 30
I. X. L.....	" 10.	" 13.	" 20.	"	121 00	121 00	"	102 00	18 00
Freeman.....	" 9.	" 15.	" 6.	Fair.....	121 00	115 00	6 00	93 00	22 00
Bruce's White Beauty.	" 9.	" 1.	" 4.	"	121 00	114 15	6 45	79 45	34 30
Earliest of All.....	" 11.	" 6.	" 1.	"	121 00	121 00	None.	80 00	41 00
Thorburn.....	" 11.	" 6.	" 5.	"	117 20	117 20	"	98 30	18 15
Early Sunrise.....	" 10.	" 6.	" 6.	Good.....	117 20	117 20	"	93 30	23 50
Polaris.....	" 10.	" 6.	" 6.	Poor.....	116 40	116 40	"	87 10	29 30
Northern Spy.....	" 11.	" 6.	Oct. 5.	Good.....	111 50	111 50	"	89 50	22 00
Early Norther.....	" 9.	" 15.	Sept. 18.	"	110 00	110 00	"	88 00	22 00
Clarke's No. 1.....	" 10.	" 15.	" 20.	"	110 00	110 00	"	88 00	22 00
Early London.....	" 12.	" 11.	" 5.	" & dry	110 00	110 00	"	70 00	40 00
Everett.....	" 11.	" 6.	" 10.	Not 1st class.	116 20	101 00	5 20	79 00	23 00
Crown Jewel.....	" 10.	" 2.	" 6.	Good.....	114 30	114 30	None.	73 00	31 30
State of Maine.....	" 10.	" 15.	" 24.	"	104 00	102 00	2 00	76 30	25 30
Vanguard.....	" 9.	" 1.	" 10.	"	91 40	91 40	None.	72 00	19 40
Pride of the Table....	" 9.	" 15.	Oct. 1.	"	88 00	88 00	"	70 30	17 30
Dreer's Standard.....	" 9.	" 15.	Sept. 25.	"	81 53	81 53	"	62 00	19 53
Harbinger.....	" 12.	" 11.	" 15.	"	81 30	81 30	"	55 00	26 30
Chicago Market.....	" 11.	" 6.	" 15.	Poor.....	77 00	73 30	3 30	60 00	13 30
Seedling No. 214.....	" 11.	" 12.	" 10.	Good.....	77 00	74 30	2 30	57 30	17 00
Early Rose.....	" 11.	" 6.	" 5.	"	68 00	65 30	2 30	55 00	10 30
Early Gem.....	" 12.	" 12.	" 20.	"	64 15	64 15	None.	35 00	29 15
Pride of the Market...	" 9.	" 15.	" 10.	"	57 07	57 07	"	48 00	9 07
Lizzie's Pride.....	" 9.	" 15.	" 15.	"	55 30	55 30	"	44 30	11 00

APPLES.

The following varieties of apples fruited this year, some of them for the first time, and some produced only a few apples.

The trees were sprayed with Bordeaux mixture before leafing out, and several times after, but the rains were so frequent, that the mixture was washed off, and as a con-

sequence, could not do its best work, and some varieties of apples were considerably damaged by spot:—

Golden Russet, Alexander, Ben Davis, Baldwin, Bombshell, Colvert, Duchess of Oldenburgh, Fameuse, Pewaukee, Fallawater, Fanny, Gravenstein, Fall Janetting, Haas, King of Tomkin's Co., Keswick Codlin, Longfield, Maiden's Blush, McMahan White, Northern Spy, Red Beitigheimer, Red Astrachan, Swaar, St. Lawrence, Shannon, Smith's Cider, Spitzenburg, 20 oz Pippin, Talman Sweet, Tetofsky, Wealthy, Yellow Bellflower, Gloria Mundi.

Henry Russet.—Larger than Golden Russet, of a bronze russet colour, free from spot, tree very productive; apple a good keeper. Season, February to March.

Anis.—Very similar to Tetofsky in appearance and time of ripening, but not so productive.

Bottle Greening.—Only three apples on the tree, medium size, affected by spot.

Blenheim Orange.—Fruit large and very handsome and of very fine quality. Season, November.

Belle de Boskoop. Produced a few apples above medium in size, handsome and appears to be a fair keeper.

Bailey Sweet.—Fruited sparingly, medium size, very handsome.

Canada Red.—Below medium in size, free from blemish, a good keeper, and good either for dessert or cooking.

Carolina Red June. Produced a few small apples of very good quality for dessert. Season, August.

Yellow Transparent.—Large, clean very handsome apple, good quality.—Season August.

Cooper's Market.—Fruit above medium, handsome, and appears to be a good keeper.

Chenango Strawberry.—Fruit medium in size, very handsome, excellent for dessert. Season, September.

Early Harvest.—Fruit medium, good quality, affected by spot and cracks. Season August.

Grimes' Golden.—This variety fruited last year and the apples were very fine for dessert in January and February. Fruit medium in size, free from spot, a good cooking apple.

Hurlburt.—Fruited, the second time with us, this year, and proves to be productive and an apple of merit.

Hastings.—Fruit small, hard and a good keeper, liable to spot, poor quality, tree a poor producer.

Jonathan.—Tree a slow grower, but productive; a fine crop this year; fruit small, handsome and of very fine quality for dessert, a good cooking apple. Season, December to February.

Jersey Sweet.—Productive, fruit medium size, juicy and good either for dessert or baking. Season October to November.

Peck's Pleasant.—Only a very few apples.

Ribston Pippin. Above medium in size, free from spot, productive, very fine flavor. Season, December and January.

Rolfe.—A free producer, a beautiful red apple, medium in size, a good cooking and dessert apple. Season, November and December.

Golden Sweet.—Above medium in size, productive, good for dessert or for baking. Season, August.

Hawley.—Tree, vigorous and productive; fruit, large and handsome, a good cooking apple. Season, October and November.

Scott's Winter.—Tree, vigorous and productive; apple medium size, handsome, a good cooking apple. Season, December and January.

Sweet Bough. Vigorous and productive; fruit very large and handsome, a very good dessert and baking apple. Season, August.

Salome. Tree vigorous and productive, medium in size, very handsome, free from spot and a good keeper. Season, January to April.



Plum-tree, in fruit, 1894, Experimental Farm, Agassiz, B.C. ; four years planted.

Waxen.—Medium in size, handsome and a good keeper. Season, January and February.

Wellington.—Above medium, handsome, good keeper, acid. Season, February.

Wolf River.—Very handsome; only three apples this year.

Stark.—Above medium, handsome and said to be a very good keeper.

Warner's King.—Vigorous grower; fruit very large, a good cooking apple. Two of the largest this year weighed, one 25½ oz., and the other 25¼ oz. respectively. Season, November.

The following is a list of the varieties received this year, bringing the collection of apples up to over 500:—

Allen's Russet, Antonovka, No. 236, 26 M., Arabka Summer, Atkinson, Aport 252, Almond Reinette, Aport 23 M., Anisim 18 M., Arabka, (Budd and Gibb,) Arabka 257, Anisovka 185, Alaska Crab, Avenarius, Borsdorf No. 19, Belle Pippin, Baraboo, Basil the Great, Beautiful Arkad 453, Bethel, Barloff, Belmont, Brightwater, Bostic Queen, Buncomb, Bloomless, Beauty of Kentucky, Cinnamon Pine, Chase's Jelly Crab, Cranberry Winter, Charlottenthaler, Charlamoff, Court Pendu Plat, Cross, 15 M., Chickasaw Crab, Cove, Crawford Pippin, Cranberry Pippin, Dartmouth Crab, Dickinson, Extra Early Margaret, Early Sweet, Enormous, Early May, Elkhorn, English Golden Russet, Excelsior, Florence Crab, Franklin Sweet, Flat Voronesh, Golden White, Good Peasant, Gideons No. 10, Gipsy Girl, Grandmother, Green Crimean, Green Stripe, Golden Ball, Gideons Best, (Peter,) Gideons 20, Gracie, Gells Beauty, Golden Beauty Crab, Gideons 30, Grindstone, Hatcher's Seedling, Hebbel White, Hare Pipka, Headly, Holman, Hughes' Virginia Crab, Hennipin, Hy-fill, Hibernial, Haskells Sweet, Indiana, Jones' Seedling, Kentucky Red Crab, Kossuth, Kentucky Longstem, Kentucky Streak, Kirkbridge, Kara Synap (Niemetz,) Kremer's Glass, Knievskoe, Kurskaya, Karabovka 21 M., Lady Elgin Crab, Lankford, North Carolina Limber-twig, Lord Nelson, Late Duchess, Lady Finger, Little's Red Winter, Lyman's Red Seedling, Long Arcade, Landsburg, Lubsk Queen, Ledenetz, Large Anis, Little Hat, Mann Pippin of Arkansas, Martha Washington, Maxey, Magnum Bonum, Missouri Red Winter, Mother, Melonen, McAfee, No. 3 Sweet, (Gideon) Newton, Orel 980, Orel 6, Orel 5, Orel 27, Ogilvie's Crab, Orel 1, Ostrakoff Glass, (Fisk) Ostrakoff, (Beadle) Oblong, Ohio Nonpareil, Ozark, Palouse, Pyles Red Winter, Pound Sweet, Peach Crab, Pickards, Palmer, Pewaukee Russet, Pointed Pipka, Prior's Red, Persian Bogdanoff, Pauls Imperial Crab, Quaker Beauty Crab, Queen's Choice Crab, Romenskoe, Repka Aport, Rambour Reinette, Rosy Voronesh, Rosy Repka, Red Queen (316), Red Streak, Reinette Gris (28), Romna (599), Red Subluck, Repolovka 1 M, Red Aport, Russian Preserve, Round Borsdorf, Red Russet, Red Limbertwig, Raspberry, Ragan's Yellow, Red Belleflower, Red Siberian Crab, Red Queen, Rutledge, Ridge Pippin, Red Cider, Stephens Red, Striped July, Stuart's Golden, Sweeting, Stone's Eureka, Simbirsk No. 5, Simbirsk No. 3, Simbirsk No. 2, Simbirsk No. 10, Simbirsk No. 4, Suislep No. 19, Skirsch (Cross Vor.), Sweet Borovinka (Beadle), Sambo, Tulpenhocken, Taffet Winter, Ukraine (Gibb,) Voronesh No. 9, Voronesh Reinette, Virginia Greening, Virginia Queen, Wandering Spy, Winter Sweet Paradise, Windsor Chief, Winter May, Winter Green, White Rambour, Watterson's No. 4, White Pigeon, White Borovinka, Watterson, Williams Favorite, No. 585, No. 20 (M), No. 569, Yellow Horse, Julian, Newells Winter.

PEARS.

Only a few of the pears fruited this year, although many of the young trees blossomed.

Margaret.—A medium sized handsome, russet red pear of very fine quality. Ripe Aug. 14th.

Seckel.—One tree produced a few of these delicious little pears. Ripe Oct. 6th.

Gliva Kurskaya.—Fruit medium sized, regular in form. Golden russet colour, and very pleasant flavor. Ripe September 6th.

Vicar of Winkfield.—Above medium in size, poor quality. Ripe Nov. 11th.

The pear orchard now contains 145 varieties ; the following additions having been made to the list during 1894 :—

Bon Chrétien, Fred. Beaudry, Jones' Seedling, Olivier de Serries, Reeder, Pitmaston Duchess, Lady Clapp. Dana's Hovey, Duhamel de Morceau, Urbaniste, Ansault, Mme Hemmingway, Hoosic, Manning's Early, Lincoln Coreless, Bartlet-Seckel, Dewey's Premium, Edmunds, André Desportes, Bordeaux, Early Bergamot, Beurré de Livonie, Exeglovka, Lemon Kharkoff, Bon Chrétien No. 15, Panna No. 33, Princess No. 3, Tonkovietka (Gibb), Gakovka, Zucherbirn (Budd), Lemon (Gibb), Lemonaya, Riga 108 (Gibb), Voronesh, 102 (Budd).

PLUMS.

The cold wet spring did not materially affect the plums, some of the young trees being so heavily laden that they had to be supported, notwithstanding that many had been considerably thinned.

The following varieties fruited :—

Saunders.—Ripe August 8th. A vigorous healthy tree, but not productive. Fruit medium size and of good quality for a few days when just ripe but soon loses its quality by keeping. Skin very thin, the slightest bruise soon turning dark, a poor shipper.

Peach.—Ripe August 8th. Fruit very large and handsome, but coarse grained and not of high quality.

Niagara.—Very similar to Bradshaw in growth and appearance of tree and fruit. Fruit averages larger than Bradshaw growing alongside, and ripens several days earlier than that variety. Ripened August 22nd. Fruit large, some specimens measuring 2 inches long by $1\frac{3}{4}$ in diameter. Very productive, fruit of very good quality.

Bradshaw.—A strong, vigorous, upright grower, and very productive. Ripe August 28th. Fruit large, reddish purple with a light blue bloom, handsome and of good quality.

Washington.—A vigorous healthy grower, productive ; fruit, large and handsome, yellow and of good quality, but will not stand shipping. Ripened, August 30th.

Victoria.—A spreading grower ; fruit large, pale red and of fine quality, productive. Two trees produced over 100 lbs. Ripe, August 28th.

Imperial Gage.—A vigorous, healthy grower, and productive ; fruit greenish yellow, larger than Green Gage and of first-class quality. Ripe, August 28th.

Jefferson.—A healthy vigorous grower and moderately productive ; fruit above medium size, golden yellow with a reddish cheek and of fair quality. Ripe, August 28th.

Columbia.—A spreading grower, and productive ; fruit large, round brownish purple with a blue bloom ; handsome, very sweet when quite ripe. Ripe, August 29th.

Moore's Arctic.—A medium grower and begins fruiting when the tree is quite young ; fruit of medium size, blue and only moderately good. Ripe August 30th.

Smith's Orleans.—A vigorous grower fairly productive ; fruit of medium size, reddish purple with a blue bloom, fair quality. Ripe, August 31st.

Large Golden Prolific.—Tree a vigorous grower, but as yet has only fruited sparingly ; fruit above medium size and of very fair quality. Ripe, September 1st.

American Violet.—A vigorous grower, fairly productive ; fruit, large, handsome and good, a good shipper. Ripe, September 2nd.

Hudson River Purple Egg.—Tree a vigorous and strong grower, fairly productive ; fruit, strikingly oblong ; quality good. Ripe, September 2nd.

Moyer.—Tree a moderate grower, but not very productive ; fruit of medium size and of medium quality. Ripe, September 3rd.

Shipper's Pride.—Vigorous and productive ; fruit above medium size, purple, handsome and of good quality. Ripe, September 3rd.

Gueii.—A vigorous grower and one of the most productive varieties yet fruited ; fruit above medium size, purple, very handsome and of good quality, a good shipper. Ripe, September 3rd.

Fellenberg.—A vigorous spreading grower, productive ; fruit of medium size, purple, sweet and good. Ripe, September 4th.

Peters' Yellow Gage.—Tree an upright strong grower, and moderately productive; fruit of medium size, handsome and of good quality, but apt to crack if not picked before quite ripe. Ripe, September 4th.

Lombard.—A vigorous grower and very productive; fruit above medium in size; dark red and of fair quality. Ripe, September 5th.

Sugar Plum.—A vigorous grower, but not productive; fruit small, nearly black, sweet and pleasant. Ripe, September 6th.

Yellow Egg.—Tree a thrifty strong grower, and fairly productive; fruit of the largest size and coarse, very handsome and a good shipper. Ripe, September 7th.

Damson.—Productive; fruit small, dark blue and rather acid. Ripe, September 7th.

Munroe.—Blue. Ripe, September 10th.

Reine Claude.—Tree vigorous and very productive; fruit medium in size, yellow and of good quality, but liable to crack when ripe, if the weather is wet. Ripe, September 8th.

Bleeker's Gage.—Tree a vigorous grower and productive. Fruit of medium size, yellow, sweet and very good. Ripe Sept. 9th.

Pond's Seedling.—A strong upright grower and very productive. Fruit very large, handsome and purple; a good shipper. Ripe Sept. 10th.

Coe's Golden Drop.—A fair grower and moderately productive. Fruit above medium in size, and yellow, of very fine quality. Ripe Sept. 10th.

Red Egg.—A vigorous grower. Fruit large and handsome. Ripe Sept. 10th.

Prune d'Agen.—A moderate grower, and productive. Fruit of medium size, violet purple. Sweet and very good. Ripe Sept. 13th.

General Hand.—A very vigorous grower, but not productive. Fruit large, golden yellow, round, and of medium quality. Ripe Sept. 10th.

The following varieties have been added this year to the collection :—

Field, Hubbard, Brunswick, Excelsior, Mason, Botankio No. 1, Bailey's Japan, Burbank, Silver Prune, Holman Prune, French Prune, Tragedy Prune, Dunlop, Bryanston's Gage, Orange, Youngken's Golden, Prince Englebert, Wangenheim, Lafayette, Henrietta, Centralia, Long Fruit, Willard, Chabot, Hawkeye. Bringing the number up to 157 varieties, more than 30 varieties fruited during the past season.

CHERRIES.

The cherry trees, were very full of bloom in spring, but the cold rains probably prevented the proper fertilization of the blossoms, and they fell off. Only the English Morello, Bessarabian, Lieb, Lithaur and Ostheim, produced a few cherries each. All the trees are vigorous and promising.

The following varieties have been added, this year :—

Cleveland, Sparhawk's Honey, Kirtland's Mary and Dwarf Rocky Mountain, making 71 varieties in all.

APRICOTS.

Although these trees blossomed very freely last spring, and on several varieties the fruit set, when they grew to be as large as Marrowfat pease they fell off.

The trees have in most cases made good growth, and promise well for next year.

The following varieties were received and planted last spring, and have made a vigorous growth :—

Longfellow, Sweet Russian, Dr. Evart Smith. We have now 26 varieties in all.

NECTARINES.

These trees were not troubled with "curl leaf" last season, and have made a fine healthy growth, and give good promise for fruit next year.

One variety, New White, has been added, making 17 in all.

MEDLARS.

The medlars have grown vigorously, and blossomed, but did not fruit.

PEACHES.

Nearly all the peach trees have made a very fine growth this year. They were sprayed, when the leaves were partly expanded, with a strong Bordeaux mixture, for the prevention of curl leaf; I am pleased to say that there was no curl leaf this year, a careful watch was made and only three affected leaves found. This disease does not appear to have been troublesome in any orchard in this locality, even where the trees were not treated to prevent it.

The trees are very promising now, and with a favourable winter, and spring, many varieties should fruit next year.

The following varieties have been added to the collection:—Miller's Cling, Large Early, Gold Dust, Crosby, Champion, Toledo Prolific, Beer's Late, Eaton's Golden, Japan Blood, Peen-to, Park's Late, Hoover's Heath, Jarles' Late White, Silver Medal, Ives' Blood (free), Yum-Yum, Bergen's Yellow, Golden Dwarf, Fourteen Ounce, Magdala, Royal Kensington, Shanghai, Pickett's Late, Barnes, Topaz, Lonoke, I.X.L., Bonanza, Henrietta, Ark. Mamm. Golden, Geary's Hold-on, Blood (free), Flater's St. John, Chas. Wood, Jessie Kerr, Albright's Late, Arkansas, Traveller, Ragan's Yellow, Christiana.

These, with those previously planted, make 178 varieties in all.

QUINCES.

The Quince trees blossomed in spring, but the blossoms fell off.

The Mammoth Japan and Col. Cheney were the only additions in quinces since my last report; in all, 12 varieties.

MULBERRIES.

The Victoria and Hicks have been added to the collection of this fruit. When the trees are a year or two older no doubt they will fruit, but up to the present they have only made each year a vigorous wood growth.

MOUNTAIN ORCHARDS.

The apple, pear, plum, cherry and peach trees, planted in the orchards on the mountain have made a vigorous growth and are very promising, and the question of picking and transporting fruit to the lower level of the valley will soon demand attention.

Preparations are being made to add considerably to the area under fruit trees on the highest bench. A number of young apple and other trees for that purpose, being in nursery rows at the present time.

Some of the grape vines planted on the benches fruited this season, but none of the fruit ripened.

Of the English gooseberries imported in the spring of 1893, a single plant each of several varieties were planted on the bench, and it was satisfactory to note that two varieties, Crown Bob and Whinham's Industry, fruited this year, and although not sprayed, neither fruit nor foliage showed any trace of mildew.

NUTS.

Filberts.—The filbert, *Corylus Avellana*, produced a small crop of fine large nuts this year. The sample produced was very uniform in size, and larger than those commonly

sold. It seems probable that filberts might be planted with profit, on the rocky hillsides so common in this province, as they would need but little care or attention.

Almonds.—The almonds have not fruited yet, but doubtless soon will, as they have made a strong healthy growth.

The following varieties have been added to the list of almonds this year :—

Princess, Terragona, Nonpareil, Ne Plus Ultra and Russian.

Chestnuts and Walnuts.—The following have been added to the list during 1894 : Hathaway and Giant Japan chestnuts, and Max Cordiformis walnut, making altogether 28 varieties of nuts.

GRAPES.

The following varieties of grapes fruited this year :—

Catawba,	Concord,	Delaware,
Wilder,	Amber Queen,	Martha,
Niagara,	Hartford,	Jessica,
Massasoit,	August Giant,	Rogers No. 28,
Early Victor,	Pocklington,	Naomi,
Agawam,	Salem,	Lindley,
Brighton,	Worden,	Herbert (Roger's 44),
Vergennes,	Florence,	Eva,
Noah,	Marion,	Wyoming Red,
Arnold's No. 1,	Lady Washington,	Woodruff Red,
Cottage,	Elvira,	Ulster,
Roger's No. 19,	Goethe (Roger's No. 1),	Ive's Seedling,
Champion,	Roger's No. 41,	Missouri Riessling,
Eldorado,	Roger's No. 24,	Buchanan,
Oriental,	Clinton.	

Of these, only three ripened before the first frost which occurred on October 15th, namely :—

Delaware, bunch and grape small. Ripe October 11th.

Jessica, bunch small and compact, grape sweet and pleasant. Ripe October 11th.

Worden, bunch small, grape irregular in size, of fair flavour. Ripe October 11th.

The following 9 varieties were nearly ripe on October 15th :—

Roger's No. 41, Champion, Ive's Seedling, Goethe (Roger's No. 1.) Wyoming Red, Niagara, Martha, Wilder and Concord.

The following varieties were received and planted this year. :—

Brilliant, Rommel, America, Carman, Dr. Collier.

Making in all 95 varieties of this fruit.

CRANBERRIES.

One hundred plants each of the Bell and Cherry cranberries were received in spring and planted in nursery rows. These will be planted out as soon as a place can be prepared for them. They are growing fairly well where they are.

FIGS.

Two each of several varieties of figs were received from Texas in the spring to replace those killed during the previous winters. These, and those which were hardier, and have lived, have grown well, but have not yet fruited.

CURRANTS.

The older plantations of currants were on land that suffered from high water which is, I think, the reason why the crop has been small and inferior in quality.

GOOSEBERRIES.

The gooseberries suffered considerably from mildew this year, but not nearly as much as formerly. They were sprayed several times, but the constant rains washed the mixture off, scarcely giving it time to produce any effect.

BLACKBERRIES.

The following fruited this year, some of them for the first time. :—

Thompson's Early Mammoth.—A strong, vigorous grower, but not productive; berry very large and handsome with a very good flavor, a little acid. Ripening August 7th.

Stone's Hardy.—A strong grower but not productive; berry only medium in size, and frequently imperfect, quality only moderately good. Ripening August 4th.

Lovett's Best.—A medium grower and fairly productive; berry medium size, sweet and very good, keeping its bright color for several days after being picked.

Evergreen.—A vigorous grower of trailing habit, productive; fruit medium size and of fair quality. Ripening August 13th.

Minnewaska.—A feeble grower, not productive, pleasant flavored and sweet but too small. Ripening August 10th.

Early Cluster.—Not a vigorous grower, but productive; berry sweet and pleasant, medium size. Ripening August 6th.

Early Harvest.—A feeble grower, but productive; berry medium sized, and very pleasant flavored. Ripening August 7th.

Crystal White.—A very feeble grower and not productive; berry small, pleasant flavoured. Ripe August 10th.

Wilson Junior.—A straggling grower, and not very productive; berry bright black, handsome, above medium size and fair in quality, acid. Ripening August 10th.

Wilson's Early.—A straggling grower and a free producer; berry above medium size, but it often has a hard core, quite acid. Ripening August 10th.

Erie.—A strong, vigorous grower and productive; berry large to very large, and very fine quality, sweet and handsome, one the best fruited this year. Ripening August 10th.

Early King.—Medium grower and very thorny, productive; berry very irregular in size, ranging from small to very large, and when perfect very sweet and pleasant flavoured. Ripening August 6th.

Lawton.—A very vigorous grower, productive; berry large, of medium quality. Ripe August 8th.

Kittatinny.—Fruited last year and again this year; canes stout and thorny, productive; berry above medium in size and of very good quality when ripe. Ripe August 9th.

Snyder, Agawam and Taylor.—Again produced heavy crops of very fine berries this year. Ripening August 1st, 4th, and 6th respectively.

The varieties thus far fruited would rank in quality as follows: Erie, Snyder, Kittatinny, Taylor, all good shippers, hardy and productive.

LUCRETIA DEWBERRY.

This variety fruited again this year, and contrary to previous experience, was very productive, and of fine quality, some of the berries being over $1\frac{1}{4}$ inches long and nearly 1 inch thick.

Owing to their trailing habit, they are very difficult to pick, unless trellised, and they are a little too soft for shipping. Ripe, July 22.

RASPBERRIES.

The following berries have fruited for the first time this year, except Cuthbert, which I have included in this report for comparison.



Blackberries in fruit, 1894, Experimental Farm, Agassiz, B. C.

Crimson Beauty.—Canes of medium growth; berry large, round, bright crimson, firm and promises to be a good shipper. Moderately prolific, a pleasant acid. Fruit ripe, July 8.

Baumforth's Seedling.—Canes vigorous in growth, berry of medium size and under medium quality. Unless it improves very much another year, it could not be regarded as a desirable berry. Ripe, July 3.

Lord Beaconsfield.—Medium grower, berry large, conical, dark red, acid and firm in flesh, would stand shipping well, not productive. Ripe, July 8.

Northumberland Filbasket.—A strong vigorous grower. Fruited sparingly. Berry large and long, color dark red, firm, flavour very good, sweet, a promising variety. Ripening July 8.

Carter's Prolific.—Canes very stout, vigorous and productive. Berry large, round, dark red, sweet and pleasant, but appeared to be a little soft. Ripe, July 12.

Franconia.—Medium, vigorous, and not very productive. Berry large, round, bright red, rather acid but of good flavour, appeared to be a little crumbly when picked. Ripe, July 9.

Carman.—A medium grower, not productive, berry rather small, bright red, acid and only medium in quality. Ripe, July 6.

Thompson.—Very bad for suckering, and canes weak. Not productive. Berry small and very crumbly, not desirable. Ripe, July 10.

Another year will be required to give these berries a fair test, but judging from this year, none of the new varieties fruited this season, are likely to prove as valuable for all purposes as the Cuthbert.

Cuthbert.—A vigorous strong grower very productive and canes stout, berry above medium in size, flavor very good and a good shipper, holds its size well to the end of the raspberry season. Ripe, July 4.

All the raspberries reported as having fruited last year, have fruited again this year with very similar results.

YELLOW RASPBERRIES.

Champlain (yellow).—A vigorous grower, productive; berry large, sweet, and very fine in flavor, but appears to be slightly crumbly; ripe, July 11th.

White Antwerp.—A moderate grower, productive; berry large, mild acid, good flavour, but pulls to pieces when picked; ripe July 7th.

Golden Queen.—A very vigorous grower; berry conical, light yellow, above medium in size, productive and of very good quality, firm, a good shipper; ripe July 10th.

BLACK CAP RASPBERRIES.

Ada.—A rather feeble grower, not productive; berry small, but very finely flavoured; ripe July 17.

Kansas (black).—A strong vigorous grower, and productive; berry above medium size, and very firm and handsome, of sweet and pleasant flavour; ripe July 15th.

Cromwell.—A strong, healthy grower, not very productive: berry large and firm, but not of high quality; ripe July 9th.

Older.—A strong grower, productive; berry large and handsome, sweet and very finely flavoured; holding size to end of season; one of the best black caps yet tried; ripe July 9th.

Progress.—A vigorous grower, but a little tender, the canes killing back at tips every winter, fairly productive; berry small, sweet and pleasant; ripe July 11th.

Lovett.—A feeble grower, and not productive; berry medium size, quality good; a bright handsome berry; ripe July 11th.

Smith's Prolific.—Not very vigorous or productive; berry very uneven in size, varying from large to very small; quality dry and seedy; ripe July 15th.

Jackson's May King.—Canes erect, but not a vigorous grower, not productive berry small, acid and seedy; ripe July 8th.

Palmer.—Canes tall, and very vigorous, productive; berry large, handsome and finely flavoured; one of the best; ripe July 10th.

Souhegan.—A moderate grower; berry of medium size and seedy, flavour poor; ripe July 14th.

PURPLE RASPBERRIES.

Shaffer's Colossal.—Canes very vigorous and tall, productive; berry large, dark purple, acid, rather soft, not handsome; ripe July 18th.

STRAWBERRIES.

The blossoms were very abundant, but owing to the repeated heavy cold rain storms, perfect fertilization did not take place, and again, when the berries were ripening, so much rain fell that the flavour and keeping qualities of the fruit were very much injured.

The following is the order of ripening of the varieties which fruited for the first time this year:—

Warfield.—Plant a vigorous grower, but the foliage inclined to rust. Berry medium in size, long neck, short weak stem, allowing the berry to drop to the ground, colour, dark red, rather soft, flavour good. Not very productive. Ripe June 14th.

Chairs.—Plant vigorous, healthy and productive. Stem short but stout. Berry large, bright red, and fine shape. Acid, but flavour good, firm and promises to stand shipping well. Ripe June 14th.

Alexander II.—Plant a strong vigorous grower, foliage healthy, stem long and stout. Berry large, dark, and coxcomb shape, firm, sweet, flavour good. Plant productive. Ripe June 14th.

Dr. Hogg.—A strong grower, foliage very large and healthy. Productive. Berry large and good shape, but does not ripen at tip for sometime after the body of the berry is coloured. Rather acid. Ripe June 14th.

Van Deman.—Plant vigorous and foliage healthy. Stem slender and short, not productive. Berry medium size, round dark red, acid, flavour very good. Ripe June 15th.

Hautbois.—Plant a vigorous grower, foliage healthy, not productive. Berry bright red, size medium to small. Flavour very fine. A very good berry for home use, but too small for a profitable market berry. Ripe June 16th.

Parker Earle.—Plant a vigorous grower, foliage healthy, stems long and stout. Berry bright red, above medium in size and very fine flavoured, a good bearer. Ripe June 16th.

Windsor Chief.—Plant a strong vigorous grower and productive. Foliage very large and healthy. Berry large, bright red, firm and flavour good, promises to be a good shipper. Ripe June 19th.

Iowa Beauty.—Plant healthy and vigorous, stem long, and holds the berry well up. Prolific. Berry large to very large, bright red, a little irregular in shape, but firm and flavour good. Ripe June 18th.

Eclipse.—Not a strong grower, foliage inclined to rust, stems short and feeble. Not prolific. Berry bright red, only medium in size and quality. Ripe June 19th.

Alpha.—Plant vigorous and healthy, stem long and stout. Fairly productive. Berry bright red. Medium in size and firm. Flavour very good. Ripe June 18th.

Empress Eugenie.—Medium grower, foliage healthy, not productive. Berries only medium in size. Flavour good. Ripe June 21st.

Yale.—A vigorous healthy grower and productive, stems long and standing up well. Berry above medium in size. Bright red, sweet, and flavour very good, firm, promises well as a shipper. Ripe June 21st.

Sir Joseph Paxton.—A strong vigorous grower, but foliage slightly rusted, stem long and stout. Berry bright red and very large, holding its size well to end of season, firm, sweet, and flavour very fine, good shape. One of the best berries fruited this season. Ripe June 23rd.

Beder Wood.—Plant vigorous and healthy, stem long and fairly strong. Berry bright red, above medium in size, flavour fine, berry a little soft. Ripe June 23rd.

Daisy.—Plant vigorous, and foliage healthy, stem long and slender. Berry large and grows in large clusters, dark red, firm and solid, good shape, rather acid but flavour first class. Ripe June 23rd.

Bonny Lass.—Plant only a medium grower, foliage healthy. Stem medium in length and stout. Berry above medium in size, not very productive, bright red, coxcomb shape. A rich flavoured sweet berry. One of the best for home use. Retains its size and quality to the last. Ripe June 25th.

Pine Apple.—Plant vigorous and healthy, stem long and stout, not productive. Berry above medium in size, but soft and flavour poor. Ripe June 26th.

Laxford Hall.—Plant vigorous and healthy, stem long and stout, not very productive. Berry only medium in size, round dark red, flavour good, sweet and very firm. Ripe June 26th.

SHELTER BELTS AND FOREST TREES.

The trees in the shelter belts have made fine growth, and only two or three have died since my last report, and these were in a low spot where the water lay a few days, during the high water in June.

The plantations on the Mountain have done remarkably well, there being a very small per cent of losses, and in most varieties a very fine growth, considering that they have received no care or cultivation since they were planted.

The walnuts and hickory nuts planted last fall on the Mountain, have done very well, at least 70 per cent of the nuts planted having grown, and there may be a larger percentage than this, as they were scattered, over a considerable area, and it is difficult to find a yearling seedling in ferns and underbrush.

Another large lot of walnuts has been received from Ontario and are being planted. There are also on hand several thousand young forest trees of varieties valued for their timber which will be planted on the Mountain next spring.

TOMATOES.

The following varieties of tomatoes were sown in a hot-bed April 24th, and transplanted June 2nd. A few ripened, but many of the plants were destroyed by water.

Early Ruby.—Ripe September 7th, very solid and few seeds, medium size, and smooth.

Atlantic Prize.—Did not ripen.

Earliest of All.—Small and seedy, ripened September 11th, not productive.

Everbearing.—Did not ripen.

Livingston's Aristocrat.—Did not ripen.

New Dwarf Champion.—Dit not ripen.

PEPPERS.

The following varieties of peppers were sown in hot bed April 24th and planted out June 6th. They all fruited freely, but none of them ripened.

Sweet Spanish.

Mammoth Golden Dawn.

Kaleidoscope.

CABBAGE.

The following varieties of cabbage were tested. Seed sown in hot bed April 22nd Transplanted May 18th.

1st.—*Burpee's Surehead*.—Head medium in size, very firm and solid.

2nd.—*Burpee's Earliest of all*.—Heads very early, but small and not compact.

3rd.—*Simmer's Matchless Flat Dutch*.—Heads fair size firm and solid.

4th.—*World Beater*.—Did not head very well, heads poor and soft.

5th.—*Mammoth Red Rock*.—Heads medium sized, very firm and hard.

6th.—*Chester King*.—Only a few plants formed heads and these were quite small.

- 7th.—*Drumhead Savoy*.—Heads medium large, very firm and compact.
8th.—*Late Drumhead*.—A few very fine heads formed but many plants did not head.
9th.—*Marblehead Mammoth*.—Did not head well ; heads small and soft.
10th.—*Autumn King*.—No heads of value formed on this variety.
11th.—*Stanley*.—Heads very small and inferior.
12th.—*Louderbach*.—Only a few small heads formed.

CAULIFLOWER.

Six varieties of cauliflower were sown in a hot bed on April 22nd and planted in the open ground, as soon in May as they were sufficiently grown. But they were injured in June by water, and failed to head.

TESTS OF DIFFERENT VARIETIES OF GARDEN PEASE.

Name of Variety.	Sown.		Up.		Fit for Table.	Remarks.
Sunol.....	May	2	May	17	July 4	Pease medium size, pods short and not well filled, medium in quality, not productive ; vines 1½ to 2 feet long.
Bliss' American Wonder.....	"	2	"	20	" 16	Pease large and fine in quality, pods long and well filled, vines 1 to 1½ feet long, not productive.
Burpee's Profusion.....	April	30	"	20	" 24	Vines 2 to 3 feet long and well loaded with long pods, well filled with large pease of good quality.
Kentish Invicta.....	"	30	"	18	" 18	Pods long and well filled, pease medium sized and rather poor in quality, vines 2 to 2½ feet long, not productive.
Juno.....	"	30	"	13	" 26	Vines 1½ to 2 feet long and very productive, pods long and well filled with large pease of very good quality.
Horsford's Market Garden.....	"	30	"	21	" 16	Vines 2 to 2½ feet long and productive, pods long and well filled with large pease of very good quality.
Daniel's Matchless Marrow.....	"	9	"	21	" 20	Vines 2½ to 3 feet long, productive, long well filled pods, pease very large and of excellent quality.
Duke of Albany.....	"	9	"	20	" 20	Vines 2½ to 3 feet, and fairly productive, pods long and well filled, pease large and of best quality.
Prince of Wales.....	"	9	"	20	" 30	Vines 2 to 3 feet long, and productive, pods of medium length and well filled, pease large and of very fine quality.

TESTS OF DIFFERENT VARIETIES OF BEANS.

Name of Variety.	Sown.		Up.		Fit for Table.	Remarks.
Burpee's Bush Lima.....	May	3	.....	.....	.....	Did not germinate.
Early Black Pole Lima.....	"	3	.....	.....	.....	"
Burpee's New String Green Pod.	"	3	May	27	July 27	Did not germinate well, and made a feeble growth, pods small and poor in quality.
Thorburn's Extra Refugee Wax.	"	3	"	24	" 26	Not a vigorous grower, pods small but very fine in quality.
Emperor William.....	"	3	"	27	" 22	Crisp and very fine for table use.

ASPARAGUS.

50 plants each of the following varieties of asparagus were received, and planted, and made a fair growth.
Barr's Mammoth, Argenteuil, and Columbian.

RADISH.

Name of Variety.	Sown.	Up.	Fit for table.	Remarks.
Scarlet Dwarf White Tip	April 24	May 3	June 7	Stringy and not crisp or pleasant to eat.
New Rosy Gem.....	" 24	" 3	" 4	Crisp and sweet.
Charters Improved.....	" 24	" 3	" 16	Not very good, and ran to seed very soon after being large enough for table use.
Pearl Forcing.....	" 24	" 2	" 11	Stringy and tough.
Burpee's Earliest Scarlet Button...	" 24	" 3	" 1	Crisp, sweet and very good.
Brightest Red Long Scarlet.....	" 24	" 2	" 18	Nearly all went to seed before becoming fit for table.
Scarlet Olive Shaped.....	" 24	" 2	" 8	Crisp, but became stringy very soon after being fit for table.

BEETS, CARROTS, PARSNIPS AND ONIONS.

Nine varieties of table beets, six of carrots, two of parsnips, and thirteen of onions were received and sown, but when the flood came the land on which they were sown became so wet that the crops of all were a failure.

EXPERIMENTS WITH DIFFERENT VARIETIES OF LETTUCE.

Name of Variety.	Sown.	Up.	Fit for Use.	Remarks.
New Iceberg.....	April 26..	May 16..	June 29..	Crisp and sweet.
New Paris Cos.....	" 24..	" 15..	July 4..	Bitter, not of good quality.
All Heart.....	" 25..	" 13..	" 2..	Crisp, sweet and a vigorous grower.
New Giant White Cos.....	" 25..	" 14..	" 4..	A vigorous grower, crisp but bitter.
New Cos or Celery.....	" 25..	" 14..	" 7..	Very crisp and sweet.
New Sensation.....	" 25..	" 14..	" 4..	Not crisp or sweet and a feeble grower.
California Cream.....	" 25..	" 14..	" 8..	Leaf blighted, turning brown in spots, which made it unfit for use.
Golden Queen... ..	" 25..	" 14..	June 27..	A vigorous grower, forming fine heads, crisp and of good quality.

PARSLEY.

The fine Triple Curled Parsley was sown April 25th, came up May 14th, and was fit for use August 6th. A very fine, vigorous grower.

CUCUMBERS.

Name of Variety.	Sown.	Up.	Fit for Table.	Remarks.
New Grand Pera.....	May 1....	May 28...	Aug. 2..	Sweet and pleasant, but not crisp or productive.
Cool and Crisp.....	" 1....	" 26...	" 1..	Crisp and of good quality, productive.
Improved White Spine....	" 1....	" 23...	July 20..	Very good quality, crisp and pleasant; productive.
Siberian Cucumber.....	" 1....	" 28...	" 26..	Very small, but of fine quality and productive.

EXHIBITIONS.

An exhibition of the produce of the Experimental Farm was made at several of the fall shows, where nearly seventy varieties of apples were shown, and a good display of 30 varieties of plums could have been made had the exhibitions been held a little earlier.

Lathyrus Sylvestris Wagneri.—All the seed raised of this fodder plant was distributed this year in small packets, as in former years, but no reports have yet been received. The plant makes a feeble growth the first year, which perhaps has discouraged farmers, and they may have ploughed it under.

A single plant 3 years old was exhibited this year, with the roots attached, showing a splendid top growth, and the roots were over 6 feet long, and at the surface of the ground 1¼ inches thick. This plant in the fall of 1891 showed a growth of a single stem, only about 9 inches long. From the strong growth of the roots this plant will probably be valuable in the interior in those parts where there is very little rain.

METEOROLOGICAL.

1894.	Highest Temper- ature.	Lowest Temper- ature.	Number of days on which it rained.	Total Rainfall.	Number of days on which sunshine was recorded.	Total amount of sunshine.		Number of snow storms.	Depth of snowfall.
						Hrs.	Min.		Inches.
January	14th 54°	5th 17°	11	4·63	16	62	18	14	58½
February	26th 50°	19th 10°	12	5·91	18	49	54	9	13
March	22nd 64°	4th 28°	15	5·81	19	51	44	8	9½
April.	25th 77°	4th 32°	25	8·28	17	63	57	None.....	None.
May	23rd 90°	1st 32°	18	4·89	21	125	27	"	"
June	2nd 89°	22nd 40°	15	3·70	20	144	12	"	"
July	13th 93°	9th 42°	11	1·28	29	303	34	"	"
August	10th 92°	5th 41°	1	·24	27	244	6	"	"
September	10th 87°	16th 41°	18	8·26	18	85	27	"	"
October	12th 69°	18th 29°	22	10·73	20	57	14	"	"
November	8th 66°	16th 25°	22	10·27	13	40	54	2	3½
December 1st to 15th.....	1st 45°	3rd 27°	9	3·23	7	22	00	2	1½
Total.	July 13th 93°	Feb. 19th 10°	172	67·23	225	1249	49	35	86
1893.	Aug. 31st 97°	Feb. 2nd 12°	178	66·58	217	1182	59	34	91½

STALLION.

The Haras National sent out the same stallion that we had last year. He made one trip to Chilliwack, and arrangements were made for further trips, but the high water made crossing the river, and travelling on the roads, impossible for a time, and prevented others on this side bringing mares to the farm. He served about the same number of mares as in the previous year.

I have the honour to be, sir,
Your obedient servant,

THOS. A. SHARPE.

STATEMENT of Expenditure on the Dominion Experimental Farms, for the Year ending
30 June, 1894.

Central Experimental Farm.		Experimental Farm—Brandon, Man.	
<i>Expenditure, 1893-94.</i>		<i>Expenditure, 1893-94.</i>	
Live stock	1,043 53	Live stock	62 85
Feed for stock.....	963 18	Feed for stock.....	204 72
Seed grain, seeds, trees, &c.....	1,159 56	Seed grain, seeds, trees, &c.....	520 57
Implements, tools and hardware supplies.....	837 43	Implements, tools and hardware supplies.....	751 96
Draining and drain tiles	311 78	Draining and drain tiles	828 51
Manure and fertilizers.....	797 31	Manure and fertilizers.....	85 75
Travelling expenses	938 30	Travelling expenses	243 65
Exhibition expenses.....	144 74	Exhibition expenses.....	182 15
Blacksmithing, harness supplies and repairs	718 95	Blacksmithing, harness supplies and repairs	320 70
Bee supplies.....	164 66	Salaries.....	2,541 05
Salaries.....	1,521 40	Wages, farm work.....	3,136 69
Wages, farm work.....	6,994 24	do care of stock.....	950 47
do care of stock.....	2,449 81	Chemical department.....	455 97
Chemical department.....	607 94	Botanical and Entomological department.....	348 75
Botanical and Entomological department.....	1,293 15	Forestry.....	452 01
Horticultural department.....	3,737 32	Office help.....	323 25
Poultry department.....	1,570 81	Seed grain distribution	266 10
Forestry department and care of grounds	1,604 47	Tree distribution	215 77
Office help and messenger service.....	1,536 32	Contingencies (including lumber supplies, repairs and fencing, \$256.26; postage, \$105; painting fence, \$73.50	747 62
Printing and stationery	271 35	do printing and stationery.....	82 75
Seed testing and care of greenhouses..	873 65	do books and newspapers.....	39 00
Dairy department.....	703 43	do telegrams and telephones.....	65 19
Contingencies (including Meteorological observations, \$78)	288 05		12,825 48
do books and newspapers ..	120 95		
do telegrams and telephones ..	228 17		
Fencing and lumber supplies.....	1,234 12		
	32,114 62		
LESS—Expenditure on account of World's Fair	600 28	Experimental Farm—Indian Head, N. W. T.	\$ cts.
	31,514 34	<i>Expenditure, 1893-94.</i>	
Experimental Farm—Nappan, N. S.		Live stock	382 25
<i>Expenditure, 1893-94.</i>		Feed for stock.....	378 28
Feed for stock	225 35	Seed grain, seeds, trees, &c.....	632 42
Seed grain, seeds, trees, &c.....	273 78	Implements, tools and hardware supplies.....	1,143 43
Implements, tools and hardware supplies.....	382 68	Manure and fertilizers.....	183 12
Draining and drain tiles	471 66	Travelling expenses.....	117 31
Manure and fertilizers.....	507 13	Exhibition expenses.....	170 50
Travelling expenses.....	165 33	Blacksmithing, harness supplies and repairs	313 42
Exhibition expenses.....	46 23	Salaries.....	2,541 05
Blacksmithing and repairs.....	75 94	Wages, farm work.....	3,523 38
Salaries.....	2,541 05	do care of stock.....	1,365 75
Wages, farm work.....	1,585 18	Chemical department.....	455 97
do care of stock.....	935 43	Botanical and Entomological dept....	348 75
Chemical department.....	455 97	Forestry.....	297 75
Botanical and Entomological department	348 75	Office help.....	155 00
Forestry.....	38 75	Seed grain distribution	134 93
Seed grain distribution	102 47	Tree distribution	40 25
Tree distribution.....	8 75	Contingencies (including postage, \$295.54; paid for cottages, \$200; lumber supplies, \$166.03; water supply, \$40.....	901 65
Contingencies (including postage, \$95.51).....	175 55	do printing and stationery.....	85 10
do printing and stationery.....	95 76	do books and newspapers.....	27 85
do books and newspapers.....	35 00	do telegrams.....	13 23
do telegrams ..	2 82		13,211 39
	8,437 58		

Experimental Farm—Agassiz, B. C.	\$ cts.	Summary of Stock, Machinery, Implements, &c., on hand June 30, 1894—Continued.	\$ cts.
<i>Expenditure, 1893-94.</i>		Brought forward.....	
Live stock.....	42 58	<i>Central Experimental Farm, Ottawa,</i>	
Feed for stock.....	230 66	Concluded.	
Seed grain, seeds, trees, &c.....	891 28	Poultry Department—171 fowls... ..	278 00
Implements, tools and hardware sup- plies.....	570 64	do —Implements,	
Manure and fertilizers.....	85 73	furnishings, &c.....	112 75
Travelling expenses.....	396 15	Bees and apiarian supplies.....	165 00
Exhibition expenses.....	13 75	Chemical Department — Apparatus,	
Blacksmithing and repairs.....	96 07	chemicals, &c.....	1,530 00
Salaries.....	2,541 05	Books in the several departments.....	140 00
Wages, farm work.....	2,188 37	Greenhouses, plants, supplies, &c.....	618 00
do care of stock.....	288 71	Offices, furniture and stationery.....	1,100 00
Chemical dept.....	455 97	Furniture at directors' house.....	1,500 00
Botanical and Entomological dept....	348 75		
Forestry.....	95 13		15,902 75
Office help.....	120 00	<i>Experimental Farm, Nappan, N. S.</i>	
Seed grain distribution.....	39 00	7 Horses.....	655 00
Tree distribution.....	7 50	Cattle—	
Clearing land.....	1,100 28	2 Durhams.....	150 00
Contingencies (including postage, \$80.55.....	112 75	7 Holsteins.....	430 00
do printing and stationery..	69 78	4 Ayrshires.....	260 00
do books and newspapers...	26 00	23 Grades.....	677 00
	9,720 15	2 Improved large Yorkshire swine...	40 00
<i>Summary.</i>		11 Berkshire swine.....	106 00
Central Experimental Farm.....	31,514 34	1 Tamworth do.....	15 00
Nappan do.....	8,437 58	12 Fowls.....	3 00
Brandon do.....	12,825 48	5 Vehicles.....	287 00
Indian Head do.....	13,211 39	Farm wagons and implements.....	436 25
Agassiz do.....	9,720 15	Farm machinery.....	784 75
	75,708 94	Harness.....	155 50
Seed grain distribution.....	3,066 08	Furniture for office, reception room, &c.	336 35
Forest tree distribution.....	84 65	Hand tools, hardware and sundries...	402 76
Printing and distribution of bulletins and reports.....	2,939 88		4,738 61
	81,799 55	<i>Experimental Farm, Brandon, Man.</i>	
Summary of Stock, Machinery, Implements, &c., on hand June 30, 1894.		10 Horses.....	1,220 00
<i>Central Experimental Farm, Ottawa.</i>	\$ cts.	Cattle—	
16 Horses.....	1,430 00	1 Ayrshire.....	100 00
Cattle—		2 Durhams.....	125 00
8 Jerseys.....	440 00	2 Holsteins.....	225 00
4 Holsteins.....	230 00	2 Grades.....	35 00
4 Ayrshires.....	280 00	85 Fowls.....	62 80
2 Devons.....	90 00	11 Vehicles, including farm wagons and sleighs.....	626 00
1 Durham.....	40 00	Farm machinery.....	1,056 00
20 Canadian.....	590 00	do implements.....	634 00
30 Grades.....	904 00	Hand tools, hardware and sundries...	673 88
4 Yorkshire swine.....	190 00	Harness.....	228 35
3 Berkshire do.....	120 00	Furniture for reception room and bed- room for visiting officials.....	252 90
3 Tamworth do.....	95 00	Furniture, supplies and books for office.	241 42
1 Essex do.....	25 00		5,480 35
1 Poland China swine.....	20 00	<i>Experimental Farm, Indian Head, N. W. T.</i>	
2 Grades swine.....	30 00	10 Horses.....	1,750 00
Farm machinery, implements, vehicles, harness, &c.....	4,629 55	Cattle—	
Dairy Department—Machinery, &c..	803 25	6 Durhams.....	355 00
Horticultural Department — Imple- ments, tools, &c.....	158 70	5 Polled Angus.....	260 00
Forestry Department — Implements, tools, &c.....	376 50	7 Holsteins.....	470 00
Botanical Department—Implements, tools, &c.....	7 00	7 Grades.....	225 00
		47 Improved large Yorkshire swine...	345 00
Carried forward.....		4 Berkshire swine.....	80 00
		1 Tamworth do.....	15 00
		Carried forward.....	

Summary of Stock, Machinery, Implements, &c., on hand June 30, 1894—Continued.		\$	cts.	Summary of Stock, Machinery, Implements, &c., on hand June 30, 1894—Concluded.		\$	cts.
Brought forward.....				<i>Experimental Farm, Agassiz, B.C.</i>			
<i>Experimental Farm, Indian Head, N. W. T.—Concluded.</i>				6 Horses		1,250	00
49 Fowls	35	00		Cattle—			
12 Vehicles, including farm wagons and sleighs.....	638	00		7 Durhams		825	00
Farm machinery	1,213	00		9 Ayrshires.....		495	00
do implements	716	00		3 Holsteins		350	00
Hand tools, hardware and sundries...	571	67		2 Grades		55	00
Harness	275	80		3 Dorset horned sheep.....		105	00
Furniture for reception room and bed- room for visiting officials.....	311	75		2 Improved large Yorkshire swine...		60	00
Furniture, supplies and books for office	225	00		2 Berkshire swine.....		70	00
	7,486	22		Fowls		37	50
				Vehicles, including farm wagons		295	00
				Farm machinery		673	50
				do implements		211	50
				Hand tools, hardware and sundries...		105	25
				Harness		124	00
				Furniture for reception room and bed- room for visiting officials.....		295	00
				Furniture, supplies and books for office		128	00
						5,079	75

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EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	-	-	-	-	-	-	WM. SAUNDERS
AGRICULTURIST	-	-	-	-	-	-	JAS. W. ROBERTSON
HORTICULTURIST	-	-	-	-	-	-	JOHN CRAIG
CHEMIST	-	-	-	-	-	-	F. T. SHUTT, M.A.
ENTOMOLOGIST and BOTANIST	-	-	-	-	-	-	JAS. FLETCHER
POULTRY MANAGER	-	-	-	-	-	-	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, Nappan, N.S.	-	-	-	-	-	-	WM. M. BLAIR
"	"	"	"	"	"	"	Brandon, Manitoba - S. A. BEDFORD
"	"	"	"	"	"	"	Indian Head, N.W.T. - ANGUS MACKAY
"	"	"	"	"	"	"	Agassiz, B.C. - THOS. A. SHARPE

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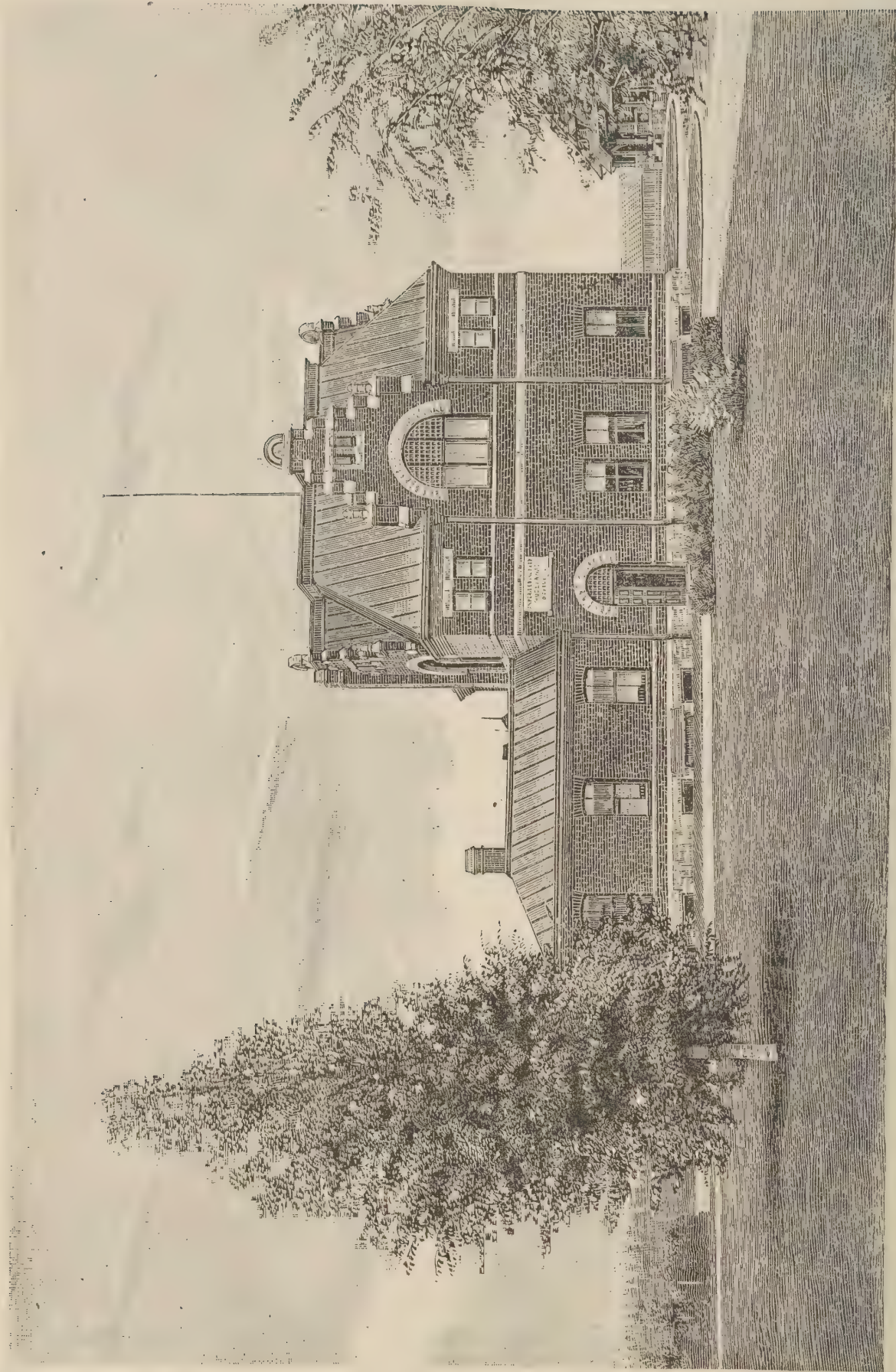
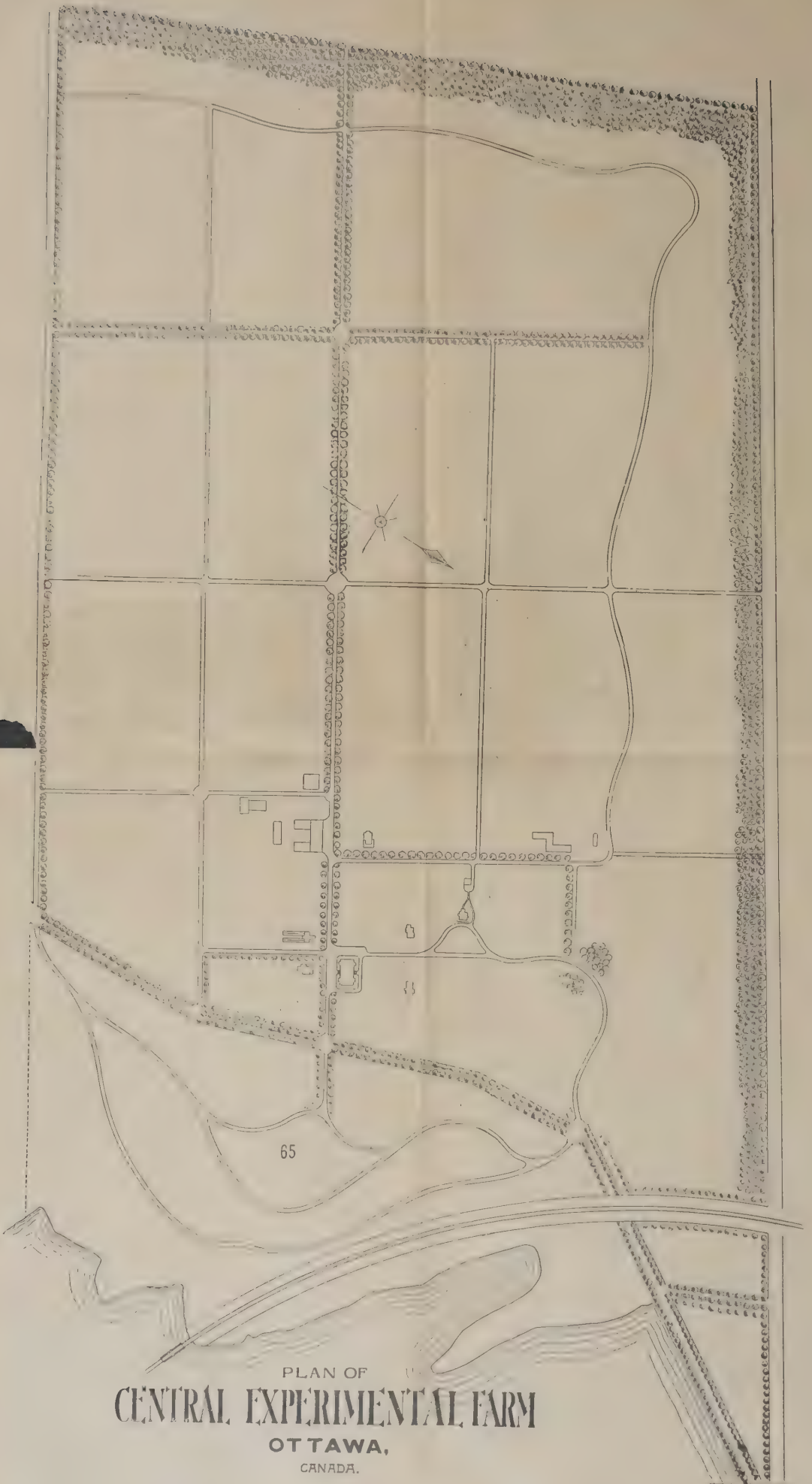


Fig. 1. OFFICE BUILDING, MUSEUM AND CHEMICAL LABORATORY OF THE CENTRAL EXPERIMENTAL FARM.



APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS.

—o—

OTTAWA, 30th November, 1895.

SIR,—I have the honour to submit for your approval the ninth annual report of the work done and in progress at the several experimental farms established in different parts of the Dominion.

You will also find appended reports from the following officers of the Central Experimental Farm: From the Agriculturist, Mr. James W. Robertson; from the Horticulturist, Mr. John Craig; from the Chemist, Mr. Frank T. Shutt; and from the Entomologist and Botanist, Mr. James Fletcher. A report is also submitted from the Poultry Manager, Mr. A. G. Gilbert.

From the branch experimental farms there are reports from Mr. Wm. M. Blair, superintendent of the experimental farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, superintendent of the experimental farm for Manitoba, at Brandon; from Mr. Angus McKay, superintendent of the experimental farm for the North-west Territories, at Indian Head; and from Mr. Thos. A. Sharpe, superintendent of the experimental farm for British Columbia, at Agassiz.

These reports contain particulars of the results of the experimental work which has been conducted in agriculture, horticulture and arboriculture embodying the outcome of much practical work in the fields, orchards, barns, dairy and poultry buildings; also of scientific investigation of chemical problems in the laboratory and the careful study of the life history and habits of noxious insects and plants, with suggestions of measures calculated to lessen the injury they cause. Also details of the experiments which have been carried on during the past year in bee-keeping.

The increasing demand among farmers for these reports is a gratifying indication of the desire for information among this class of the community and of the high esteem in which these records of the work of the experimental farms are held. It is hoped that the facts brought together in the present issue will be found of practical value to the agricultural community, and that the information given will assist in the advancement of agriculture in Canada.

I have the honour to be, sir,

Your obedient servant,

WM. SAUNDERS,

Director.

The Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS.

REPORT OF THE DIRECTOR.

(WM. SAUNDERS, F.R.S.C., F.L.S. F.C.S.)

In submitting the results of the ninth year of work in connection with the experimental farms, it is gratifying to be able to record good returns at all the farms and unusually large yields on some of them, especially in regard to the grain grown on the two branch farms in the Canadian North-west. At the experimental farm at Indian Head, in the North-west Territories, the crops have been unusually heavy, much more than double the produce of 1894, and the returns at the experimental farm at Brandon have been a substantial advancement on the previous year. These unusually favourable returns indicate good climatic conditions, and from the crop reports issued by the Agricultural Department of the Government of Manitoba, it is evident that these favourable conditions have prevailed over a very large part of that province, and have resulted in an unprecedented yield of all the more important grain crops. Much advancement has been made throughout the north-western part of the Dominion in stock raising. In beef cattle alone there has been exported from Manitoba 22,000 head, which is about double the number exported in 1894. In the dairying industry continued and rapid progress has been made in nearly all the settled districts in the Dominion, there has also been much increase in the production of swine and poultry. Some smaller branches of agricultural industry have received increased attention, the area under flax has been more than doubled in Manitoba, and there has been a larger output of fruits in Nova Scotia and British Columbia.

The crops which have been obtained during the past year at the several experimental farms are believed to fairly represent the agricultural capabilities of much of the land in the provinces and territories whose interests these farms are intended to serve. At the central farm however, the crops are less representative than usual owing to exceptional conditions of weather. While the greater part of Ontario suffered during the summer from a protracted drought which proved injurious to most agricultural crops, a section of the province lying adjacent to the boundary of Quebec in which the Central Experimental Farm is located has been favoured with an abundant rainfall most of which has been favourably distributed throughout the season. For this reason the crops at the central farm as compared with many parts of the province of Ontario are exceptionally good.

The experimental tests which have been carefully carried on with many varieties of all the more important agricultural crops for some years, have been continued during

the past season and the accumulated results obtained are increasing in value and trustworthiness as the facts which are gleaned each season are added to the information gained in previous years. In this way evidence of the strongest character is being accumulated as to the relative yield, earliness of ripening and other valuable qualities of the many different sorts of agricultural products under test. Also as to the best methods of preparing the land and the most suitable times for sowing.

As the experimental farms are too few and too widely separated to fully represent all the different climates and other conditions affecting agriculture throughout the Dominion, the endeavour has been made to enlist the co-operation of farmers everywhere in the useful work of testing varieties by distributing among them for this purpose samples of such products as have proved most valuable at the experimental farms. The heartiness with which the farmers of Canada have entered into this work has made it difficult to meet the wishes of all, and for lack of sufficient material some of those who have applied for samples late in the season have been unavoidably disappointed. During the spring of 1895, the number of applications received for samples for test was more than 31,000 and the number sent out was 26,036. In this way more than 40 tons of excellent seed all of which had been thoroughly cleaned, was distributed in three pound bags among about 26,000 farmers. A first distribution has also been made during the past season of some of the more promising varieties of new cereals which have been produced by cross fertilization at the experimental farms. About 2,000 samples of these have been sent out in one-pound bags for trial, and from the reports already received there is reason to believe that some of these will prove valuable additions to the list of varieties now in general cultivation. This work in all its branches has been undertaken with the hope that the samples distributed will with careful management, shortly produce sufficient quantities to sow in large acreage and that by thus gradually introducing without cost to the grower seed of the best and most productive varieties to replace such as are inferior, the yields of the various crops grown by Canadian farmers may be increased and their quality improved. The appreciation which has been manifested by the large class of producers for whose special benefit the experimental farms have been established not only of this but of all branches of the work undertaken is most encouraging.

EXPERIMENTS WITH OATS.

Comparative tests have been made during the season of 1895 with 45 varieties of oats, to ascertain their relative yield, earliness, and other qualities. They were all sown on the 29th and 30th of April, on plots of $\frac{1}{20}$ th acre each. The soil was a clay loam of fair quality, which was manured in the spring of 1891 with about 20 tons of barn-yard manure per acre. It also received an application of wood ashes late in the autumn of 1893, about 150 bushels to the acre. No fertilizers have been applied since. The previous crop was wheat. The land was ploughed about 2 inches deep after the harvest of 1894 with the gang plough, and harrowed with the smoothing harrow, to cover and germinate weed seeds, and later in the autumn it was ploughed 8 inches deep. In the spring of 1895 it was gang-ploughed and harrowed with the smoothing harrow before sowing.

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of days Maturing	Length of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per bushel.	Rusted.
			Inches.	Inches.		Bush. lbs.	Lbs.	
Banner.....	Aug. 6..	98	48 to 55	9 to 10	Branching..	74 4	34	Slightly.
Abundance.....	do 6..	98	50 to 57	8 to 10	do ..	73 8	34 $\frac{1}{2}$	do
American Beauty.....	do 8..	100	51 to 55	8 to 10	do ..	72 12	35	do
Improved Ligowo.....	do 6..	99	48 to 54	7 $\frac{1}{2}$ to 9	do ..	70 20	38	do
Golden Beauty.....	do 8..	101	48 to 55	8 to 9	do ..	69 4	33 $\frac{1}{2}$	do
Columbus.....	do 7..	100	48 to 54	8 to 10	do ..	69 4	32 $\frac{1}{2}$	do
American Triumph.....	do 7..	100	48 to 57	8 to 10	do ..	68 18	34 $\frac{1}{2}$	do
White Russian.....	do 6..	98	52 to 55	8 to 10	Sided.....	67 32	33 $\frac{1}{2}$	do
Bavarian.....	do 8..	100	48 to 55	8 to 9	Branching..	67 2	33 $\frac{1}{2}$	do
White Schonen.....	do 7..	100	45 to 56	8 to 10	do ..	66 2	34 $\frac{1}{2}$	do
Wide Awake.....	do 9..	102	48 to 57	8 to 10	do ..	65	35	do
Wallis.....	do 8..	100	50 to 56	8 to 10	do ..	63 28	34	do
Cream Egyptian.....	do 7..	99	48 to 55	7 $\frac{1}{2}$ to 9	Half sided..	62 22	39 $\frac{1}{2}$	Very slightly.
Oderbruch.....	do 7..	99	48 to 57	7 to 8	do ..	60 20	38 $\frac{1}{2}$	do
Abyssinia.....	do 6..	98	48 to 56	7 to 9	do ..	60	38	Slightly.
Early Golden Prolific..	do 5..	97	48 to 52	8 to 10	Branching..	59 24	32 $\frac{1}{2}$	do
Joanette.....	do 9..	102	42 to 50	7 to 9	do ..	59 24	34 $\frac{1}{2}$	do
Californian Prolific Blk.	do 11..	104	48 to 60	8 to 9	Sided.....	59 14	33	do
Lincoln.....	do 5..	97	42 to 54	8 to 10	Branching..	58 28	32 $\frac{3}{4}$	do
Golden Giant.....	do 13..	105	45 to 53	10 to 11	Sided.....	58 8	30 $\frac{1}{2}$	Considerably.
Giant Cluster.....	do 13..	105	42 to 54	10 to 11	do	58 8	31 $\frac{1}{2}$	do
Flying Scotchman.....	do 1..	93	54 to 60	8 to 10	Branching..	58 8	36 $\frac{3}{4}$	Very slightly.
Coulommiers.....	do 22..	115	51 to 55	8 to 10	do ..	56 16	33 $\frac{3}{4}$	Slightly.
Early Archangel.....	July 27..	88	42 to 55	8 to 10	do ..	56 6	40 $\frac{1}{4}$	Very slightly.
Prolific Black Tartarian	Aug. 11..	104	50 to 60	8 to 9	Sided.....	56 6	31 $\frac{3}{4}$	Slightly.
Early Blossom.....	do 11..	103	48 to 54	8 to 10	Half sided..	55 30	36 $\frac{3}{4}$	Considerably.
Imported Irish.....	do 1..	93	52 to 56	10 to 12	Branching..	55 30	41 $\frac{1}{2}$	Very slightly.
Rosedale ..	do 6..	98	48 to 55	7 $\frac{1}{2}$ to 9	Half sided..	55 30	38	Slightly.
Poland.....	do 1..	93	42 to 54	7 to 9	Branching..	55 10	38 $\frac{1}{4}$	Very slightly.
Holstein Prolific.....	do 8..	101	48 to 57	8 to 9	do ..	54 4	34	Slightly.
Early Gothland.....	do 5..	97	48 to 55	7 $\frac{1}{2}$ to 8 $\frac{1}{2}$	Half sided..	52 2	36 $\frac{1}{2}$	do
Scottish Chief.....	July 29..	91	48 to 60	9 to 11	Branching..	51 6	39 $\frac{1}{2}$	Very slightly.
Victoria Prize.....	do 30..	92	52 to 60	9 to 11 $\frac{1}{2}$	do ..	51 6	40 $\frac{1}{4}$	do
Bonanza.....	Aug. 1..	94	52 to 55	10 to 11	do ..	51 6	40 $\frac{3}{4}$	Slightly.
Welcome.....	do 5..	98	52 to 57	10 to 12	do ..	49 14	37	Considerably.
Early Etampes.....	do 9..	102	40 to 51	7 to 9	do ..	48 28	34	Slightly.
Prize Cluster.....	do 1..	93	53 to 57	10 to 11	do ..	48 28	40 $\frac{1}{2}$	Very slightly.
White Wonder.....	July 29..	91	50 to 54	10 to 12	do ..	46 6	40 $\frac{3}{4}$	do
Siberian.....	Aug. 13..	106	50 to 60	9 to 11	Sided.....	45 10	33	Slightly.
Winter Grey.....	do 1..	94	46 to 54	9 to 11	Branching..	42 22	40 $\frac{1}{2}$	Very slightly.
Hazlett's Seizure.....	do 7..	100	48 to 55	9 to 11	do ..	42 12	38 $\frac{1}{2}$	do
Rennie's Prize White..	do 4..	96	52 to 57	9 to 11	do ..	40	40	do
White Monarch.....	do 15..	108	40 to 50	7 to 11	do ..	34 24	37 $\frac{1}{2}$	Considerably.
Scotch Hopetown.....	do 20..	112	51 to 55	8 to 10	do ..	28 8	31	Badly.
Royal Doncaster Prize..	do 16..	109	48 to 60	9 to 11	do ..	16 16	38	Considerably.

FIELD CROPS OF OATS.

Abundance.—Five acres. Sown on soil chiefly sandy loam, with a small proportion of peaty loam. The land was manured in the spring of 1894, with about 18 tons of barn-yard manure to the acre and cropped in 1894 with Prize Cluster oats. It was gang-ploughed after harvest about two inches deep, and harrowed with the smoothing harrow to cover and germinate weed seeds, and ploughed about 8 inches deep later in the season. In the spring of 1895 it was gang-ploughed again about 4 inches deep and harrowed with the smoothing harrow immediately before sowing. Sown 10th of May; two bushels per acre; came up 21st of May, and was ripe on 13th August. The time to mature was 95 days. The yield per acre was 44 bushels 22 lbs.; weight per bushel, 32 $\frac{1}{2}$ lbs.; length of head, 8 to 9 inches, branching; length of straw, 40 to 46 inches; lodged in a few spots where land was low; made a strong even growth, and was very slightly rusted.

Bavarian.—Five acres. Sown on sandy loam adjoining the Abundance, the land having had the same manuring and treatment. The previous crop in this instance was also Prize Cluster oats. Sown 10th of May; two bushels per acre; came up 21st May, and was ripe on 19th August. The time to mature was 101 days. The yield per acre was 39 bushels 11 lbs.; weight per bushel, 34 lbs. Length of head, 9 to 10 inches; branching; length of straw 45 to 48 inches; standing fairly well—a few small spots only lodged; medium growth and very even; leaves and stems slightly rusted.

Wallis.—Eight acres. This was on sandy loam adjoining the Bavarian, and the manuring and treatment of the land was the same as for that variety. The previous crop was oats. Sown 10th May; two bushels per acre; came up 21st of May, and was ripe on 16th of August. The time to mature was 98 days. The yield per acre was 43 bushels 13 lbs.; weight per bushel, $34\frac{3}{4}$ lbs. Length of head, 8 to 10 inches; branching; length of straw, 45 to 48 inches; standing fairly well; only a few spots lodged; strong even growth; leaves and stems slightly rusted.

Golden Giant Side.—Six and one-half acres. The soil was sandy, with a whitish sandy subsoil, and was previously in meadow. This land was ploughed in the autumn when a fair second crop of clover was turned under. In the spring about 12 tons of barn-yard manure per acre was applied; the manure being distributed in small piles just as the snow was melting in the spring and spread over the land as soon as it was dry. This was ploughed under by turning a furrow about 5 inches deep, and it was harrowed with the smoothing harrow before sowing. Sown 11th of May; two and one-quarter bushels per acre; came up 21st of May, and was ripe 23rd of August. The time to mature was 104 days. The yield per acre was 39 bushels 11 lbs.; weight per bushel, $28\frac{1}{2}$ lbs. Length of head, 7 to 9 inches; sided; length of straw, 46 to 50 inches; all standing well; made a strong even growth, and was very slightly rusted.

Banner.—Five acres. The land on which these oats were grown was sandy loam. The previous crop was part tobacco, part fall wheat, part Indian corn, and part oats. That portion of the land which was cropped with oats and tobacco in 1894, was manured in the spring of that year with about 12 tons of barn-yard manure per acre. This was not ploughed in the autumn of 1894, but was ploughed in the spring of 1895 from 6 to 7 inches deep, and harrowed with a smoothing harrow before sowing. The other part of the land, which was under fall wheat and Indian corn in 1894, was manured in the spring of 1893 with about 10 tons of barn-yard manure per acre, and cropped with oats that year. This land was ploughed in the autumn of 1894 about 8 inches deep and again in the spring of 1895 about 5 to 6 inches deep. Sown 17th May; two bushels per acre; came up 25th of May, and was ripe 20th of August. The time to mature was 95 days. Yield per acre, 45 bushels 6 lbs.; weight per bushel 30 lbs. Length of head, 8 to 10 inches; branching; length of straw, 44 to 52 inches; standing fairly well, only a few small spots lodged; growth strong and even; leaves and stems slightly rusted.

Early Gothland.—Five acres. In this instance the soil was a sandy loam, which was manured in the spring of 1894 by an application of about 15 tons of barn-yard manure per acre. This land was previously in meadow and the manure was used as a top dressing. It was ploughed in the autumn of 1894 about 8 inches deep, and ploughed again in the spring from 5 to 6 inches deep, and disc-harrowed and harrowed with the smoothing harrow before sowing. Sown 15th of May; $1\frac{1}{2}$ bushels per acre; came up 23rd of May, and was ripe 19th of August. The time to mature was 96 days. Yield per acre, 48 bushels 8 lbs.; weight per bushel, $32\frac{3}{4}$ lbs. Length of head, 8 to 9 inches; sided; length of straw, 48 to 54 inches; straw coarse and badly lodged; leaves and stems slightly rusted.

Oderbruch.—Three-fourths of an acre. This was sown adjoining the Early Gothland, and the soil and treatment of the land was similar. Sown 15th of May; $1\frac{1}{2}$ bushels per acre; came up 23rd of May, and was ripe 17th of August. The time to mature was 94 days. Yield per acre, 45 bushels 12 lbs.; weight per bushel, $32\frac{1}{2}$ lbs. Length of head, 7 to 9 inches; sided; length of straw, 45 to 50 inches; made a strong and even growth, but was considerably lodged; leaves and stems slightly rusted. This variety has a stiff straw and has usually stood well. The lodging in this instance was

probably due to the fact that the land on which it was sown was considerably elevated, and the oats were thus exposed to the full force of the winds.

Siberian.—Seven-eighths of an acre. This also was sown on land adjoining Early Gothland, and on similar soil, with the same treatment. Sown 15th of May; $1\frac{3}{4}$ bushels per acre; came up 23rd of May, and was ripe 25th of August. The time to mature was 102 days. Yield per acre, 38 bushels 28 lbs.; weight per bushel, $32\frac{1}{2}$ lbs. Length of head, 8 to $9\frac{1}{2}$ inches; sided; length of straw, 48 to 55 inches; made a strong, even growth, but was considerably lodged, probably for the reason that the land was elevated and the oats thus exposed to the full force of the winds. The leaves and stems were very slightly rusted.

Rosedale.—Five and one-half acres. In this field the greater part of the soil was peaty, with a small proportion of sandy loam. The land was manured late in March, 1895, after most of the snow had melted, leaving just enough for sleighing, and the manure was distributed in small heaps, convenient for spreading as soon as the ground was dry. This land was previously in meadow. It was ploughed in the autumn of 1894 about 8 inches deep, and again in the spring of 1895 to a depth of 5 or 6 inches, and harrowed with the smoothing harrow before sowing. Sown 21st of May; $1\frac{1}{2}$ bushels per acre; came up 29th of May, and was ripe 23rd of August. The time to mature was 94 days. Yield per acre, 29 bushels 24 lbs.; weight per bushel, $24\frac{1}{2}$ lbs. Length of head, 8 to 9 inches; half sided; length of straw, 45 to 51 inches; all standing well; growth fairly strong and even; leaves and stems badly rusted. This variety of oats has hitherto given large crops, and the unusually low yield in this instance may be attributed to the unsuitable character of the land, and the rust.

Rennie's Prize White.—One and one-half acres. The soil was sandy loam, which was manured and treated in the same manner as the field of Rosedale oats. Sown 21st of May; $1\frac{1}{2}$ bushels per acre; came up 27th of May, and was ripe 14th of August. The time to mature was 85 days. Yield per acre, 22 bushels 9 lbs.; weight per bushel, $27\frac{3}{4}$ lbs. Length of head, $8\frac{1}{2}$ to $9\frac{1}{4}$ inches; branching; length of straw, 42 to 45 inches, made a strong and even growth, but was considerably lodged; leaves and stems badly rusted. The comparatively small yield and light weight given by this usually good variety was no doubt due to the lodging and rust.

Early Golden Prolific.—Three and one-fifth acres. This was sown on land adjoining Rennie's Prize White; the soil was similar, and the manuring and treatment the same. Sown 21st of May; 2 bushels per acre; came up 27th of May, and was ripe 22nd of August. The time to mature was 93 days. Yield per acre, 35 bushels 22 lbs.; weight per bushel, $27\frac{3}{4}$ lbs. Length of head, 7 to 9 inches; branching; length of straw, 40 to 45 inches; growth medium and even, but badly lodged and broken down before fully ripe; leaves and stems considerably rusted. This oat is a new candidate for public favour. It is rather light in the grain, and, judging from the results of the test at Ottawa this year, it does not compare favourably, either in yield or quality, with many of the most esteemed sorts already in cultivation.

Joanette.—Two acres. This field was adjoining that of the Rosedale; the manuring and treatment of the land was the same, but the soil was peaty. Sown 22nd of May; $1\frac{1}{2}$ bushels per acre; came up 30th of May and was ripe 6th September. The time to mature was 107 days. Yield per acre, 24 bushels 16 lbs.; weight per bushel, $25\frac{1}{4}$ lbs. Length of head, 6 to 8 inches; branching; length of straw, 32 to 45 inches; made a medium but rather uneven growth, and the straw was badly broken down; the leaves and stems were badly rusted.

This is a small black oat, which makes a short growth of straw, and which, in ordinary loamy soils, usually stands well and yields a good crop. The oat also retains its colour well. The comparatively small crop given in this instance, was no doubt due to the unsuitable character of the soil. This variety is not distinguishable from that formerly grown under the name of Longfellow.

Poland White.—Two and one-sixth acres. This was sown adjoining the Joanette and on similar soil, and the manuring and treatment were the same. Sown 22nd of May; $1\frac{1}{2}$ bushels per acre; came up 30th of May and was ripe 26th of August. The time to mature was 96 days. Yield per acre, 29 bushels 32 lbs.; weight per bushel, $28\frac{1}{4}$ bs

Length of head, 6 to 8 inches ; branching ; length of straw, 45 to 52 inches ; the growth was strong and even and the straw stood fairly well ; leaves and stems considerably rusted. The light crop and light weight of the grain in this instance also may be attributed to the unsuitable character of the land, and the rust.

EXPERIMENTS WITH BARLEY.

Thirty-six varieties of barley have been tested during the past season, nineteen of which were two-rowed sorts, and seventeen six-rowed. These were all sown in plots of $\frac{1}{20}$ th acre each ; the two-rowed varieties were all sown on the 2nd of May and the six-rowed sorts on the 1st and 2nd of May. These plots were adjoining those for the test of varieties of oats, the soil was similar and the treatment of the land the same. The previous crop was oats.

TWO-ROWED BARLEY—TEST OF VARIETIES.

NAME OF VARIETY.	Date of sowing.	Date of ripening	No. of days maturing.	Length of Straw.	Length of head.	Kind of head.	Yield per acre.	Weight per bushel.	Rusted.
				Inches.	Inches.		Bush. Lbs.	Lbs	
Sidney	May 2..	Aug. 1.	91	42 to 48	3 to 4	Two-rowed .	43 16	49 $\frac{3}{4}$	Very slightly.
Nepean	do 2..	do 1.	91	46 to 49	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	do ..	37 34	48	do
Duck-bill	do 2..	do 7.	97	46 to 50	3 to 3 $\frac{1}{2}$	do ..	37 24	48	do
Pacer	do 2..	do 1.	91	42 to 45	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	do ..	36 12	48	do
Bolton	do 2..	do 4.	94	43 to 48	3 $\frac{1}{2}$ to 5	do ..	35 30	47 $\frac{3}{4}$	Slightly.
Beaver	do 2..	do 7.	97	45 to 48	4 to 4 $\frac{1}{2}$	do ..	35 ..	48 $\frac{3}{4}$	do
French Chevalier...	do 2..	do 7.	97	43 to 48	4 to 5	do ..	34 18	46	Considerably.
Victor	do 2..	do 1.	91	40 to 47	3 to 4	do ..	33 26	48 $\frac{3}{4}$	Very slightly.
Prolific (Wrinch)...	do 2..	do 4.	94	36 to 42	3 $\frac{1}{2}$ to 4 $\frac{1}{2}$	do ..	30 40	46 $\frac{1}{2}$	Slightly.
Suffolk Coast Cheva-									
lier No. 1	do 2..	July 30.	89	36 to 42	4 to 5	do ..	30 10	44	do
Newton	do 2..	Aug. 9.	99	45 to 46	3 to 4	do ..	29 18	47 $\frac{3}{4}$	Considerably.
Monck	do 2..	do 9.	99	52 to 55	3 to 4	do ..	28 36	51	Very slightly.
Suffolk Coast Cheva-									
lier, No. 2	do 2..	July 30.	89	34 to 42	4 to 5	do ..	28 36	43 $\frac{3}{4}$	Slightly.
Prize Prolific	do 2..	Aug. 7.	97	44 to 47	4 $\frac{1}{2}$ to 5	do ..	28 6	44 $\frac{1}{4}$	Considerably.
Danish Chevalier...	do 2..	do 8.	98	39 to 43	4 to 5	do ..	27 34	47 $\frac{1}{2}$	Slightly.
Kinver Chevalier...	do 2..	do 4.	94	42 to 45	4 to 5	do ..	26 42	44	do
Californian Prolific..	do 2..	do 8.	98	40 to 44	3 to 3 $\frac{3}{4}$	do ..	26 2	46 $\frac{1}{4}$	do
Canadian Thorpe...	do 2..	do 8.	98	42 to 45	3 to 4	do ..	25 40	46 $\frac{1}{4}$	do
Improved Thanet...	do 2..	do 7.	97	41 to 45	4 to 5	do ..	21 42	44 $\frac{1}{2}$	do

SIX-ROWED BARLEY—TEST OF VARIETIES.

Mensury	May 1..	July 24.	84	45 to 48	3 to 4	Six-rowed ..	58 6	47 $\frac{1}{2}$	No rust.
Petschora	do 2..	do 19.	78	33 to 42	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$	do ..	51 42	47 $\frac{1}{2}$	do
Royal	do 2..	do 20.	79	35 to 43	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$	do ..	51 12	49 $\frac{1}{4}$	Very slightly.
Success	do 2..	do 17.	76	39 to 46	2 to 2 $\frac{3}{4}$	do ..	51 12	45	No rust.
Odessa	do 2..	do 24.	83	36 to 42	2 $\frac{1}{2}$ to 3	do ..	47 24	46 $\frac{3}{4}$	Very slightly.
Oderbruch	do 2..	do 28.	87	41 to 45	2 $\frac{1}{2}$ to 3	do ..	47 14	48 $\frac{1}{4}$	do
Trooper	do 1..	do 22.	82	39 to 42	2 $\frac{1}{2}$ to 3	do ..	46 42	50	do
Stella	do 2..	do 19.	78	41 to 45	2 $\frac{1}{4}$ to 3	do ..	46 2	46 $\frac{1}{2}$	do
Vanguard	do 2..	do 20.	79	40 to 42	2 $\frac{1}{2}$ to 3	do ..	44 28	46 $\frac{1}{4}$	do
Common	do 1..	do 20.	80	40 to 44	2 $\frac{1}{2}$ to 3	do ..	43 46	49	do
Nugent	do 1..	do 25.	85	40 to 43	2 $\frac{1}{2}$ to 3	do ..	42 44	45 $\frac{3}{4}$	do
Pioneer	do 2..	do 22.	81	42 to 46	2 $\frac{1}{2}$ to 3	do ..	42 34	47 $\frac{3}{4}$	do
Baxter's	do 2..	do 20.	79	36 to 43	2 to 2 $\frac{1}{2}$	do ..	40 10	48 $\frac{1}{2}$	do
Summit	do 1..	do 24.	84	42 to 45	2 $\frac{1}{2}$ to 3	do ..	39 28	47 $\frac{3}{4}$	do
Phoenix	do 2..	do 22.	81	42 to 48	2 $\frac{1}{4}$ to 2 $\frac{3}{4}$	do ..	37 14	47 $\frac{1}{2}$	do
Surprise	do 1..	do 26.	86	36 to 45	2 $\frac{1}{4}$ to 3	do ..	36 12	49 $\frac{3}{4}$	No rust.
Rennie's Improved..	do 2..	do 24.	83	41 to 48	2 $\frac{1}{4}$ to 2 $\frac{3}{4}$	do ..	32 14	48	Very slightly.

FIELD CROPS OF BARLEY—TWO-ROWED SORT.

Canadian Thorpe.— $3\frac{3}{4}$ acres. In this instance most of the soil was sandy loam, a small proportion only was peaty. This land was manured in the spring of 1893 with about 18 tons of barn-yard manure per acre and was cropped that year with oats. In 1894 it was under wheat. It was ploughed in the autumn of 1894 about 8 inches deep, and disc-harrowed in the spring of 1895 and harrowed with the smoothing harrow before sowing. Sown 3rd May, 2 bushels per acre, came up 8th May, and was ripe 6th August. The time to mature was 95 days. Yield per acre 24 bushels 34 lbs.; weight per bushel $49\frac{3}{4}$ lbs. Length of head $3\frac{3}{4}$ inches; two-rowed; length of straw, 36 to 38 inches, growth medium but very uneven in character on account of variation in the quality of the land, all standing well, leaves considerably and stems very slightly rusted.

SIX-ROWED SORTS.

Royal.—One acre. The soil on which this barley was sown was clay loam; the previous crop was oats. The land was manured in the spring of 1894 with about 18 tons of barn-yard manure per acre. It was gang-ploughed after harvest about 2 inches deep, and harrowed to cover and start weed seeds, and ploughed again about 8 inches deep later in the autumn. In the spring of 1895 it was gang-ploughed, and harrowed with the smoothing harrow before sowing. Sown 2nd May, $1\frac{3}{4}$ bushels per acre, came up 8th May, and was ripe July 24th. The time to mature was 83 days. Yield per acre 39 bushels 8 lbs.; weight per bushel 51 lbs.; length of head, 3 to $3\frac{1}{2}$ inches; six-rowed; length of straw, 34 to 38 inches; growth medium and fairly even, all standing well, no smut or rust.

Trooper.—One acre. This was sown adjoining Royal on similar soil which had received the same manuring and treatment. The previous crop was oats. Sown 2nd May; $1\frac{3}{4}$ bushels per acre, came up 8th May, and was ripe 26th July. The time to mature was 85 days. Yield per acre, 39 bushels, 23 lbs.; weight per bushel, 51 lbs.; length of head, $2\frac{1}{2}$ to 3 inches; six-rowed; length of straw, 30 to 36 inches; growth medium to under medium, no rust or smut. In this plot the grain ripened irregularly.

Mensury.—One acre. This also was adjoining Royal, and was manured and treated in the same manner, the soil being partly clay loam and partly peaty. It was sown 2nd May, $1\frac{3}{4}$ bushels per acre, came up 8th May, and was ripe on the clay loam 26th July, and on the lower peaty land August 6th. The time to mature was from 89 to 96 days. Yield per acre, 40 bushels 20 lbs.; weight per bushel, $49\frac{1}{4}$ lbs.; length of head, $3\frac{1}{2}$ to 4 inches; six-rowed; length of straw 36 to 40 inches; all standing well, growth very strong and even, leaves slightly rusted, no rust on stems.

Vanguard.—One-half acre. This was sown adjoining Mensury on soil the larger portion of which was sandy loam, the remainder peaty. The manuring and treatment of the land was the same as that given under Royal. The previous crop was oats. Sown 2nd May, $1\frac{3}{4}$ bushels per acre, came up 8th May, and was ripe on the higher sandy loam 23rd July, and on the lower peaty soil on 6th August. The time to mature was from 82 to 96 days. Yield per acre 27 bushels 34 lbs.; weight per bushel, 49 lbs.; length of head, $2\frac{1}{2}$ to $3\frac{1}{2}$ inches; six-rowed; length of straw 30 to 35 inches, all standing well; growth medium and even, leaves considerably rusted, no rust on stems.

Summit.—One-half acre. This was adjoining Vanguard on similar land, and the manuring and treatment was the same as for Royal. The previous crop was oats. Sown 2nd May, $1\frac{3}{4}$ bushels per acre came up 8th May, and was ripe on the higher sandy loam 1st August, and on the peaty land 5th August. The time to mature was from 91 to 95 days. Yield per acre, 30 bushels 4 lbs.; weight per bushel, 50 lbs.; length of head, $2\frac{1}{2}$ to 3 inches; six-rowed; length of straw, 36 to 40 inches; all standing well; growth medium and even; leaves considerably rusted, no rust on stems.

Nugent.—One-half acre. This land adjoined that on which Summit was sown, was of similar character and had the same manuring and treatment. Sown 2nd May, $1\frac{3}{4}$ bushels per acre, came up 8th May, and was ripe on the higher sandy loam 1st August, and on the lower peaty land 5th August. The time to mature was from 91 to 95 days.

Yield per acre, 30 bushels 20 lbs.; weight per bushel, 48 lbs.; length of head, 2½ to 3 inches; six-rowed; length of straw, 36 to 40 inches; all standing well; growth medium and even; leaves considerably rusted, no rust on stems. A frost which occurred on the 17th of May injured the plants on that part of this plot where the land was low and peaty and thus lessened the yield.

EXPERIMENTS WITH SPRING WHEAT.

During the season of 1895, forty-three varieties of spring wheat were tested, all on plots of ½ acre each. The land on which these wheats were grown was adjoining that used for the test of varieties of oats, the soil was similar and the treatment of the land the same. The previous crop was barley.

SPRING WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of sowing.	Date of ripening	No. of days maturing.	Length of Straw.	Length of head.	Kind of head.	Yield per acre.	Weight per bushel.	Rusted.
				Inches.	Inches.		Bush. Lbs.	Lbs	
Preston.....	May 1.	Aug. 5.	96	50 to 52	3 to 3½	Bearded....	30 40	62½	Slightly.
Goose.....	do 1.	do 12.	103	48 to 54	2 to 2½	do	28 20	60½	do
Old Red River... .	do 1.	do 12.	103	44 to 50	2¾ to 3¼	Beardless....	26 30	59¼	do
Pringle's Champlain.	do 1.	do 7.	98	46 to 52	3 to 3½	Bearded....	26 20	59	Very slightly.
Hungarian.....	Apr. 30.	do 10.	102	44 to 50	2½ to 3	do	26 10	61¾	Slightly.
Huron.....	May 1.	do 7.	98	48 to 53	2½ to 3½	do	25 40	59½	do
Wellman's Fife.....	do 1.	do 12.	103	48 to 56	3 to 4	Beardless....	25 20	59½	Considerably.
Dion's.....	do 1.	do 9.	100	46 to 54	3 to 4	Bearded....	24 40	61	Very slightly.
White Russian.....	do 1.	do 12.	103	52 to 55	3 to 4	Beardless....	24 27	59	Slightly.
Red Fern.....	do 1.	do 9.	100	46 to 54	3¼ to 4	Bearded....	24 20	60¼	Very slightly.
Monarch.....	do 1.	do 12.	103	51 to 56	3½ to 4¾	Beardless....	24 10	60¾	Slightly.
Alpha.....	Apr. 30.	do 6.	98	48 to 53	2½ to 3½	do ...	24	61¾	do
Admiral.....	do 30.	do 5.	97	44 to 51	2½ to 3½	do ...	24	58¾	Considerably.
Advance.....	May 1.	do 7.	98	48 to 54	2½ to 3½	Bearded....	24	58	Slightly.
Emporium.....	do 1.	do 9.	100	48 to 52	3 to 3¾	do	24	60¼	Very slightly.
Percy.....	Apr. 30.	do 5.	97	48 to 54	3 to 4	Beardless....	23 40	59	Slightly.
Red Fife.....	do 30.	do 9.	101	45 to 48	2¾ to 3½	do ...	23 40	60	do
Captor (red chaff)... .	May 1.	do 5.	96	50 to 54	3 to 3¾	do ...	23 34	58¼	do
Vernon.....	do 1.	do 7.	98	42 to 52	2½ to 3	Bearded....	23 30	59¼	Considerably.
Colorado.....	do 1.	do 7.	98	40 to 45	2½ to 3	do	23 20	60¾	Slightly.
Blenheim.....	do 1.	do 7.	98	51 to 54	2½ to 3½	do	23 10	57½	do
Percy (white chaff)..	Apr. 30.	do 5.	97	48 to 54	3 to 3½	Beardless....	22 50	60¼	do
Stanley.....	do 30.	do 4.	96	45 to 51	3 to 3¾	do ...	22 43	59½	do
Progress.....	do 30.	do 5.	97	48 to 50	3 to 3¾	do ...	22 40	60¼	do
White Fife.....	do 30.	do 9.	101	36 to 48	2½ to 3	do ...	22 39	60½	do
Crown.....	May 1.	do 7.	98	52 to 57	2¾ to 3¾	Bearded....	22 30	59¼	do
Captor.....	do 1.	do 4.	95	48 to 54	3 to 3½	Beardless....	22 10	58¾	do
Ladoga.....	do 1.	do 1.	92	48 to 53	2¾ to 3½	Bearded....	21 40	59	do
White Connell.....	do 1.	do 12.	103	46 to 50	2¾ to 3½	Beardless....	21 34	59¾	do
Campbell's White Chaff.....	do 1.	do 8.	99	46 to 52	2½ to 3½	do ...	20 20	58¾	do
Rio Grande.....	do 1.	do 14.	105	51 to 58	3½ to 4½	Bearded....	20 20	60	do
Beauty.....	Apr. 30.	do 7.	99	48 to 51	3 to 4	Beardless....	20 10	57¾	Considerably.
Beaudry's.....	May 1.	do 6.	97	38 to 46	2½ to 3½	Bearded....	19 40	59¼	Very slightly.
Gehun with Ladoga.	do 1.	do 2.	93	40 to 45	2½ to 3¾	do	19	55¾	Slightly.
Black Sea.....	do 1.	do 2.	93	48 to 52	2½ to 3½	do	19	59¾	Very slightly.
Herisson Bearded..	do 1.	do 7.	98	40 to 44	1½ to 1¾	do	18 20	59½	Slightly.
Dawn.....	Apr. 30.	July 30.	91	38 to 42	2½ to 3	Beardless....	17 50	58	Considerably.
Countess.....	do 30.	Aug. 4.	96	42 to 48	2½ to 3½	do ...	17 40	61¼	Slightly.
Golden Drop.....	May 1.	Aug. 7.	98	44 to 50	2¾ to 3	do ...	17 20	55¾	do
Dufferin.....	do 1.	July 30.	90	43 to 48	2½ to 3½	Bearded....	16 10	55	do
Rideau.....	do 1.	Aug. 4.	95	42 to 48	2½ to 3	Beardless....	15 50	54¾	Considerably.
Early Sonora, with Red Fife.....	do 1.	do 4.	95	42 to 48	2¾ to 3½	do ...	14 40	59	do
Gehun.....	do 1.	do 9.	100	42 to 47	2¾ to 3¾	do ...	13 40	60¼	Slightly.

FIELD CROPS OF SPRING WHEAT.

The following acre and half acre plots of spring wheat were all sown in the one field. The soil was clay loam of fair quality. The previous crop was pease. The land was manured in the autumn of 1894 with about 18 tons of barn-yard manure per acre which was immediately ploughed under. In the spring of 1895 it was gang-ploughed and harrowed with the smoothing harrow before sowing.

Percy.—One acre, sown 2nd May, $1\frac{1}{2}$ bushels per acre, came up 8th May, and was ripe 8th August. The time to mature was 98 days. Yield per acre, 16 bushels 27 lbs.; weight per bushel, 58 lbs. Length of head, 3 to $3\frac{1}{2}$ inches; beardless, length of straw, 40 to 44 inches; standing fairly well, medium to strong growth and even. Leaves and stems considerably rusted.

Advance.—One acre, sown 2nd May, $1\frac{1}{2}$ bushels per acre, came up 8th May, and was ripe 5th August. The time to mature was 95 days. Yield per acre, 18 bushels 39 lbs.; weight per bushel, 56 lbs.; length of head, 3 to $3\frac{1}{4}$ inches, bearded; length of straw, 40 to 42 inches, all standing well; growth strong and even, leaves considerably and stems slightly rusted.

Preston.—One acre, sown 2nd May, $1\frac{1}{2}$ bushels per acre, came up 8th May, and was ripe 4th August. The time to mature was 94 days. Yield per acre, 21 bushels 39 lbs.; weight per bushel, $57\frac{1}{2}$ lbs. Length of head, 3 to $3\frac{1}{4}$ inches, bearded; length of straw, 44 to 46 inches, all standing well; growth medium and even, some smut; leaves considerably and stems slightly rusted.

Huron.—One acre, sown 2nd May, $1\frac{1}{2}$ bushels per acre, came up 8th May, and was ripe 7th August. The time to mature was 98 days. Yield per acre, 21 bushels, 5 lbs.; weight per bushel, $58\frac{3}{4}$ lbs. Length of head, 3 to $3\frac{1}{2}$ inches, bearded; length of straw, 40 to 42 inches, all standing well; growth medium to strong and even, some smut, leaves and stems considerably rusted.

Crown.—One acre, sown 2nd May, $1\frac{1}{2}$ bushels per acre, came up 8th May, and was ripe 7th August. The time to mature was 98 days. Yield per acre, 17 bushels 38 lbs.; weight per bushel $58\frac{1}{4}$ lbs. Length of head 3 to $3\frac{1}{2}$ inches, bearded, length of straw 40 to 44 inches; all standing well; growth medium and even, some smut, leaves and stems badly rusted.

Rio Grande.—One acre, sown 2nd May, 2 bushels per acre, came up 8th May, and was ripe 13th August. The time to mature was 104 days. Yield per acre 20 bushels 31 lbs.; weight per bushel, $60\frac{3}{4}$ lbs. Length of head, 4 inches, bearded; length of straw, 44 to 46 inches, all standing well; growth strong and even, some smut, leaves considerably and stems slightly rusted.

Alpha.—One-half acre, sown 2nd May, $1\frac{1}{2}$ bushels per acre, came up 8th May, and was ripe 8th August. The time to mature was 99 days. Yield per acre, 20 bushels 54 lbs.; weight per bushel, $58\frac{1}{2}$ lbs. Length of head, 3 to $3\frac{1}{2}$ inches, beardless; length of straw, 36 to 41 inches; all standing well; growth medium and even, some smut, leaves considerably and stems slightly rusted.

Dion's.—One-half acre, sown 2nd May, $1\frac{1}{2}$ bushels per acre, came up 8th May, and was ripe 12th August. The time to mature was 103 days. Yield per acre 23 bushels, 4 lbs.; weight per bushel, 61 lbs. Length of head, $3\frac{1}{2}$ to 4 inches, bearded; length of straw about 40 inches; very little smut, leaves and stems slightly rusted.

EXPERIMENTS WITH FALL WHEAT.

Twenty-five varieties of fall wheat have been under test during the past season most of them in plots of $\frac{1}{40}$ th of an acre each. They were all sown on the 6th of September, 1894, and harvested from the 17th to the 22nd of July, 1895. The soil was sandy loam and the previous crop was barley. The land was ploughed shallow after harvest to germinate weed seeds and was ploughed again in September and harrowed before sowing, sown September 6th, $1\frac{3}{4}$ bushels per acre. The growth was all strong to very strong and even, and no winter killing occurred in any of the varieties named.

FALL WHEAT—TEST OF VARIETIES.

Name of Variety.	Length of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
	Inches.	Inches.		Bush.	Lbs.	Lbs.	
Dawson's Golden Chaff	52 to 60	2 ³ / ₄ to 3 ¹ / ₂	Beardless...	45	20	61	Considerably.
Hungarian	48 to 52	2 ¹ / ₄ to 3	Bearded....	44		64 ¹ / ₄	Slightly.
Genesee Giant	48 to 52	2 ¹ / ₄ to 2 ³ / ₄	"	43		61	"
Democrat	45 to 54	2 ³ / ₄ to 3 ³ / ₄	"	42		63 ¹ / ₂	Very slightly.
Bailey	46 to 52	2 ¹ / ₂ to 3	"	41	20	61 ¹ / ₄	Slightly.
Manchester with Democrat (Bearded White Chaff)....	48 to 52	2 ¹ / ₂ to 3 ¹ / ₄	"	40	40	64	Very slightly.
Johnson	48 to 50	2 ¹ / ₂ to 3	"	40	40	61	Slightly.
Pride of Genesee	45 to 54	3 to 3 ³ / ₄	"	38	40	63 ³ / ₄	Considerably.
Early White Leader	48 to 54	3 to 3 ¹ / ₂	Beardless...	38		59	"
Jones' Winter Fife.....	45 to 52	3 to 3 ¹ / ₂	"	36	40	62 ¹ / ₄	Very slightly.
American Bronze.....	47 to 55	3 to 4	"	36	40	60 ³ / ₄	Considerably.
Golden Cross.....	46 to 52	2 ¹ / ₄ to 2 ³ / ₄	Bearded....	34	40	63 ³ / ₄	Slightly.
Jones' No. 87.....	52 to 60	3 to 4	Beardless...	34	40	62 ¹ / ₄	Considerably.
Weld's No. 4.....	48 to 52	2 ³ / ₄ to 3 ¹ / ₂	"	33	50	62 ¹ / ₂	Very slightly.
Manchester.....	45 to 48	3 to 3 ³ / ₄	"	33	20	62	"
Early Red Clawson.....	45 to 48	3 to 3 ³ / ₄	"	33		61 ¹ / ₄	"
Willits.....	48 to 52	2 ³ / ₄ to 3 ¹ / ₄	"	32	2	60 ¹ / ₄	Slightly.
Tasmania	45 to 54	2 ¹ / ₂ to 3 ¹ / ₄	Bearded....	32		63 ³ / ₄	Very slightly.
Stewart	46 to 52	2 ³ / ₄ to 3 ¹ / ₄	Beardless...	31	35	59	"
Roberts	48 to 54	3 to 3 ³ / ₄	Bearded....	31	20	62 ² / ₄	"
Surprise	45 to 48	2 ³ / ₄ to 3 ¹ / ₄	Beardless...	30	40	60 ¹ / ₂	"
From South of Russia.....	36 to 42	1 ³ / ₄ to 2 ³ / ₄	Bearded....	29	40	64	No rust.
White Chaff Rivet.....	45 to 60	2 ¹ / ₄ to 3 ¹ / ₂	"	29	20	60 ¹ / ₂	Very slightly.
Manchester with Democrat (Bearded Red Chaff)	42 to 48	3 to 3 ¹ / ₂	"	27	33	63 ¹ / ₂	"
Martin's Amber	41 to 55	3 to 3 ³ / ₄	Beardless...	27	20	64 ¹ / ₂	"

EXPERIMENTS WITH PEASE.

Seventeen varieties of pease were grown in plots of one-twentieth acre each, these embrace the standard sorts associated with four of the new cross-bred sorts produced at the Experimental Farm, the results of this test are given in table No. 1. Forty-one additional varieties were sown on plots of one-fortieth acre each. These were all cross-bred sorts produced at the farm ; and the particulars of this test will be found in table No.2. In table No. 3 are recorded the results of ten additional cross-bred sorts sown in smaller plots for the reason that the seed was not available in sufficient quantity to admit of sowing them in the larger plots.

The soil on which these pease were sown was sandy loam and the previous crop was wheat. The land was manured in the spring of 1893 with about 18 tons of barn-yard manure per acre and cropped that year with oats. It was ploughed in the autumn of 1894, about 8 inches deep and disc-harrowed in the spring of 1895 and harrowed with the smoothing harrow before sowing.

It will be observed that two of the new cross-bred sorts head the list as to yield in the one-twentieth acre plots, that the first six of the cross-breds in table No. 2 and the first two in table No. 3, have given larger returns than the best of those in table No. 1. Among these best yielders there are some very promising sorts which with the seed now available can be tested on larger areas next season.

PEASE—Test of Varieties. Table No. 1. On plots of $\frac{1}{20}$ th acre each.

Name of Variety.	Date of sowing.	Date of ripening	No. of days maturing.	Character of growth.	Length of straw.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.
					Inches.	Inches.		Bush. Lbs.	Lbs.
Paragon	May 4..	Aug. 19	107	Strong.....	60 to 84	2 $\frac{1}{2}$ to 3	Medium	45 40	60 $\frac{3}{4}$
Prince	" 6..	" 16	102	"	48 to 60	2 to 3	Large...	43 20	60 $\frac{3}{4}$
Black-eyed Marrowfat..	" 3..	" 11	100	"	60 to 84	2 $\frac{1}{2}$ to 3	" ..	40 10	63 $\frac{1}{4}$
Mummy	" 4..	" 11	99	"	48 1 $\frac{1}{2}$ to 3 $\frac{1}{4}$		Medium	39 30	64 $\frac{1}{2}$
Prussian Blue	" 4..	" 9	97	"	60 to 70	2 to 2 $\frac{3}{4}$	" ..	39 20	63 $\frac{1}{2}$
Pride	" 3..	" 7	96	Medium.....	24 to 30	2 to 2 $\frac{1}{2}$	Large...	39 ..	62 $\frac{3}{4}$
Pearl	" 4..	" 18	106	Very strong.	84 to 96	2 $\frac{1}{2}$ to 3	" ..	38 30	62
Large White Marrowfat.	" 3..	" 13	102	"	84 to 96	2 $\frac{1}{2}$ to 3	" ..	36 50	63 $\frac{1}{2}$
Prince Albert	" 4..	" 20	108	"	84 to 96	2 to 2 $\frac{3}{4}$	Small ..	36 20	63 $\frac{1}{2}$
Centennial	" 3..	" 12	101	Strong.....	60 to 72	2 $\frac{1}{2}$ to 3	Medium	34 40	63 $\frac{3}{4}$
Crown	" 4..	" 9	97	"	51 to 56	2 to 2 $\frac{1}{2}$	Small ..	33 30	63 $\frac{3}{4}$
Creepers	" 3..	" 7	96	"	48 to 54	2 to 2 $\frac{1}{2}$	" ..	33 20	63 $\frac{1}{2}$
New Potter	" 3..	" 10	99	"	60 to 72	2 to 2 $\frac{3}{4}$	Large...	33 ..	63 $\frac{1}{2}$
Multiplier	" 3..	" 12	101	"	60 to 72	2 to 2 $\frac{1}{2}$	Small ..	31 50	63 $\frac{3}{4}$
Golden Vine	" 4..	" 9	97	"	48 to 56	1 $\frac{1}{2}$ to 2	" ..	30 30	64 $\frac{1}{2}$
Canadian Beauty	" 3..	" 12	101	"	60 to 78	2 $\frac{1}{2}$ to 3	Large...	30 20	63
Weston	" 4..	" 20	108	"	72 to 84	2 $\frac{1}{2}$ to 3	Medium	24 50	62 $\frac{1}{2}$

PEASE—Test of Varieties. Table No. 2, all cross-bred sorts. On plots of $\frac{1}{40}$ th acre each.

Name of Variety.	Date of sowing.	Date of ripening	No. of days maturing.	Character of growth.	Length of straw.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.
					Inches.	Inches.		Bush. Lbs.	Lbs.
Macoun	May 6..	Aug. 21	107	Strong.....	72 to 84	2 $\frac{1}{2}$ to 3	Large...	51 40	63 $\frac{1}{4}$
Arthur	" 6..	" 14	100	Medium to strong...	36 to 72	2 to 2 $\frac{1}{2}$	Medium	51 ..	62
Bedford	" 6..	" 16	102	Medium to strong...	48 to 84	2 to 2 $\frac{1}{2}$	" ..	49 20	62 $\frac{1}{4}$
Mackay	" 6..	" 14	100	Strong.....	48 to 60	2 $\frac{1}{2}$ to 3	Large...	47 40	61 $\frac{3}{4}$
Agnes	" 6..	" 10	96	"	66 to 78	2 $\frac{1}{2}$ to 3	" ..	47 ..	61 $\frac{1}{4}$
Bruce	" 4..	" 13	101	Medium.....	48 to 54	2 $\frac{1}{2}$ to 3	" ..	46 ..	61 $\frac{1}{4}$
Carleton	" 6..	" 18	104	Strong.....	60 to 72	2 to 2 $\frac{1}{2}$	Medium	45 ..	62
Kent	" 6..	" 19	105	"	60 to 96	2 $\frac{1}{2}$ to 3	Large...	44 20	62
Duke	" 4..	" 13	101	Medium.....	48 to 60	2 $\frac{1}{2}$ to 3	" ..	44 20	61 $\frac{1}{2}$
Trilby	" 6..	" 15	101	do to strong...	36 to 60	2 $\frac{1}{2}$ to 3	Medium	44 ..	60 $\frac{3}{4}$
Luther	" 6..	" 15	101	Strong.....	48 to 72	2 $\frac{1}{2}$ to 3	Large ..	43 40	61 $\frac{1}{4}$
Victoria	" 4..	" 15	103	"	60 to 84	2 $\frac{1}{4}$ to 3	" ..	43 20	62
Tracey	" 6..	" 14	100	Medium.....	36 to 60	2 $\frac{1}{2}$ to 3	" ..	43 20	62
Alma	" 6..	" 18	104	Strong.....	72 to 84	2 to 2 $\frac{1}{2}$	Small ..	43 20	62
Surrey	" 6..	" 20	106	"	72 to 84	2 $\frac{1}{2}$ to 3	Large...	43 ..	61 $\frac{1}{4}$
Elva	" 4..	" 21	109	"	60 to 84	2 $\frac{1}{2}$ to 3	Medium	41 40	62 $\frac{1}{4}$
Vincent	" 6..	" 10	96	Medium.....	48 to 57	2 $\frac{1}{2}$ to 3	Large...	41 20	61 $\frac{1}{4}$
Vasey	" 6..	" 18	104	Strong.....	60 to 84	2 $\frac{1}{4}$ to 3	Large...	41 ..	61 $\frac{1}{4}$
Bright	" 6..	" 18	104	"	60 to 84	2 $\frac{1}{4}$ to 3	Medium	40 40	61 $\frac{1}{4}$
Archer	" 6..	" 16	102	"	48 to 60	2 to 2 $\frac{1}{2}$	" ..	40 40	63
Derby	" 6..	" 21	107	"	60 to 72	2 $\frac{1}{2}$ to 3	Large...	40 40	61 $\frac{3}{4}$
Fenton	" 6..	" 10	96	Medium.....	48 to 54	2 $\frac{1}{4}$ to 3	" ..	40 40	60 $\frac{3}{4}$
Nelson	" 6..	" 10	96	Strong.....	42 to 60	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	Medium	40 20	62 $\frac{1}{4}$
No. 13	" 6..	" 20	106	"	72 to 84	2 $\frac{1}{2}$ to 3	Large...	38 20	61 $\frac{3}{4}$
No. 49	" 6..	" 17	103	"	60 to 72	2 $\frac{1}{2}$ to 3	Medium	38 ..	61 $\frac{3}{4}$

PEASE—TEST OF VARIETIES.

TABLE No. 2. Continued.—All Cross-bred Sorts on Plots of $\frac{1}{40}$ th th acre each.

Name of Variety.	Date of sowing.	Date of ripening	Number of days maturing.	Character of growth.	Length of straw.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.
					Inches.	Inches.		Bush. Lbs.	Lbs
No. 21.....	May 4..	Aug. 14	102	Medium to strong....	36 to 60	2 $\frac{1}{2}$ to 3	Large...	37 40	61 $\frac{1}{4}$
No. 58.....	" 6..	" 13	99	Strong.....	72 to 84	2 $\frac{1}{2}$ to 3	"	37 40	61 $\frac{1}{4}$
No. 43.....	" 4..	" 14	102	"	60 to 84	2 to 2 $\frac{1}{2}$	Small ..	37 20	63 $\frac{1}{4}$
No. 5.....	" 4..	" 19	107	"	60 to 84	2 $\frac{1}{2}$ to 3	Medium	37 20	61 $\frac{1}{4}$
No. 9.....	" 6..	" 17	103	"	60 to 72	2 $\frac{1}{2}$ to 3	Large...	37 ..	60 $\frac{1}{4}$
No. 3.....	" 6..	" 15	101	Medium....	48 to 60	2 $\frac{1}{2}$ to 3	Medium	36 40	61
No. 24.....	" 6..	" 21	107	Strong.....	72 to 84	2 to 2 $\frac{1}{2}$	Small ..	36 ..	62 $\frac{1}{4}$
No. 52.....	" 6..	" 9	95	"	48	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$	Large...	34 40	61
No. 39.....	" 4..	" 19	107	"	48 to 84	2 $\frac{1}{2}$ to 3	Medium	33 ..	61 $\frac{1}{4}$
No. 55.....	" 6..	" 14	100	Medium ..	48 to 54	2 $\frac{1}{2}$ to 3	Large...	32 ..	61 $\frac{1}{4}$
No. 80.....	" 6..	" 20	106	Strong.....	72 to 84	2 $\frac{1}{2}$ to 3	Medium	31 40	62 $\frac{1}{4}$
No. 40.....	" 6..	" 21	107	"	72 to 84	2 to 2 $\frac{1}{2}$	Small ..	30 20	62 $\frac{1}{4}$
No. 30.....	" 6..	" 21	107	"	72 to 84	2 to 2 $\frac{1}{2}$	"	29 ..	63
No. 28.....	" 4..	" 20	108	Very strong.	84 to 96	2 to 2 $\frac{1}{2}$	"	27 40	62 $\frac{1}{4}$
No. 35.....	" 6..	" 19	105	Strong.....	72 to 84	2 $\frac{1}{2}$ to 3	Large...	27 40	62 $\frac{1}{4}$
No. 36.....	" 6..	" 19	105	"	72 to 84	2 $\frac{1}{2}$ to 3	Medium	26 ..	61 $\frac{1}{4}$

Table No. 3.—All Cross-bred Sorts on Small Plots.

No. 70.....	May 6..	Aug. 13	99	Strong.....	60 to 72	2 $\frac{1}{2}$ to 3	Large...	54 ..	61 $\frac{3}{4}$
No. 66.....	" 6..	" 13	99	"	48 to 60	2 $\frac{1}{2}$ to 3	Medium	48 ..	61 $\frac{3}{4}$
No. 65.....	" 6..	" 14	100	"	60 to 72	2 $\frac{1}{2}$ to 3	"	41 ..	61
No. 77.....	" 6..	" 13	99	"	72 to 84	2 $\frac{1}{2}$ to 3	"	32 ..	59 $\frac{1}{4}$
No. 76.....	" 6..	" 13	99	"	60 to 72	2 to 2 $\frac{1}{2}$	"	29 ..	60 $\frac{1}{4}$
No. 71.....	" 6..	" 16	102	"	72 to 84	2 $\frac{1}{2}$ to 3	Large...	24 52	62 $\frac{1}{4}$
No. 73.....	" 6..	" 13	99	Medium....	48 to 60	2 $\frac{1}{2}$ to 3	"	21 30	59 $\frac{1}{4}$
No. 72.....	" 6..	" 17	103	Strong.....	72	2 to 2 $\frac{1}{2}$	"	21 3	61 $\frac{1}{4}$
No. 64.....	" 6..	" 20	106	"	72 to 84	2 $\frac{1}{2}$ to 3	"	21 3	62 $\frac{1}{4}$
No. 68.....	" 6..	" 16	102	"	60 to 72	2 $\frac{1}{2}$ to 3	"	18 10	60 $\frac{1}{4}$

FIELD PLOTS OF PEASE.

Mummy.—One and a half acres of this variety were sown on a soil which was clay loam mixed with more or less peat. The previous crop was oats. The land was manured in the spring of 1892 with about 18 tons of barn-yard manure per acre—no fertilizer has been applied since. It was ploughed very shallow in the autumn of 1894 to cover and start weed seeds, and later in the season it was ploughed 8 inches deep. In the spring it was gang-ploughed and harrowed with the smoothing harrow before sowing. Sown 15th May; 2 $\frac{1}{2}$ bushels per acre; came up 27th May, and was ripe 20th August. The time to mature was 97 days. Yield per acre, 21 bushels 4 lbs.; weight per bushel, 63 $\frac{1}{4}$ lbs. The growth was fairly even and strong, but the land was weedy, and the soil unsuitable, which will to some extent account for the comparatively light crop.

Five additional varieties of pease were sown on one acre and half acre plots, adjoining each other on similar soil, where all had the same treatment. The soil was sandy loam, rather light in character; the previous crop was part sunflowers and part corn. The land was manured in the spring of 1893, when about 18 to 20 tons of barn-yard manure was applied per acre. Late in the autumn of 1894, after the sunflower heads were harvested, the stalks were burnt on the field and the land ploughed about 8 inches

deep. In the spring it was disc-harrowed and harrowed with the smoothing harrow before sowing.

New Potter.— $\frac{1}{2}$ acre ; sown 9th May ; $2\frac{1}{2}$ bushels per acre ; came up 21st May, and was ripe on 17th August. The time to mature was 100 days. Yield per acre, 29 bushels 30 lbs. ; weight per bushel, $61\frac{3}{4}$ lbs. Growth very strong and even.

Canadian Beauty.— $\frac{1}{2}$ acre ; sown 9th May ; $3\frac{1}{2}$ bushels per acre ; came up 21st May, and was ripe 16th August. The time to mature was 99 days. Yield per acre, 30 bushels 54 lbs. ; weight per bushel, $63\frac{1}{2}$ lbs. Growth strong and even.

Pride.— $\frac{1}{2}$ acre ; sown 9th May ; 3 bushels per acre ; came up 21st May, and was ripe 14th August. The time to mature was 97 days. Yield per acre, 36 bushels 2 lbs. ; weight per bushel, $62\frac{1}{4}$ lbs. Growth strong and even.

Large White Marrowfat.—One acre , sown 9th May ; $3\frac{1}{2}$ bushels per acre, came up 21st May, and was ripe 19th August. The time to mature was 102 days. Yield per acre, 36 bushels 6 lbs. ; weight per bushel, 63 lbs. Growth strong and even.

RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These tests were all conducted on similar land, the plots adjoining each other. The soil was a light sandy loam, fairly uniform in character, which has been devoted to these experiments for the past six years. The arrangement of these plots has been changed from year to year so that the different varieties of grain have followed each other in regular succession. No barn-yard manure has been applied to this land since 1891, but it received a dressing of wood ashes, about 150 bushels to the acre, during the winter of 1894-95, the ashes being applied when the land was free or nearly free from snow. Thirty-six plots of $\frac{1}{10}$ th acre each, have been used for this purpose, twelve of which have been devoted to six successive sowings of two varieties of oats and a like number to barley, wheat and pease. The first sowing in each case has been made as soon as the land was in fit condition to receive the seed, and the subsequent sowings a week apart, until six successive sowings were made. Full particulars of the results of these tests which have been conducted at all the experimental farms will be found in Bulletin 21, from which fairly reliable data can be had as to the best time for seeding in the several provinces and territories of the Dominion.

The land has been ploughed each year in the autumn and disc-harrowed in the spring, and immediately before sowing each set of plots the smoothing harrow has been used, so as to destroy any weeds which may have germinated, and thus give to each series of plots the same chance at the start as to condition of soil.

OATS SOWN AT DIFFERENT DATES.

Name of Variety.	When Sown.	Date of Ripening.	No. of days maturing.	Length of Straw.	Weight of Straw per acre.	Yield of Grain per acre.	Weight per bushel.	Rusted.
				Inches.	Lbs.	Bush.lbs.		
Abundance	April 20..	Aug. 2..	104	38 to 40	2,870	45 ..	34	Very slightly.
"	" 27..	" 8..	103	40 to 42	4,445	76 1	33 $\frac{1}{2}$	Considerably.
"	May 4..	" 12..	100	38 to 40	3,500	58 33	32	Very slightly.
"	" 11..	" 17..	98	38 to 42	3,685	47 17	32 $\frac{1}{2}$	Slightly.
"	" 18..	" 21..	95	40 to 48	2,845	50 5	28	Considerably.
"	" 25..	" 24..	91	30 to 42	3,250	31 26	31	"
Banner	April 20..	" 2..	104	38 to 40	3,375	65 15	35 $\frac{1}{2}$	Very slightly.
"	" 27..	" 8..	103	40 to 45	4,575	81 1	33 $\frac{1}{4}$	Considerably.
"	May 4..	" 12..	100	38 to 40	3,510	64 4	33 $\frac{1}{4}$	Very slightly.
"	" 11..	" 17..	98	40 to 48	4,170	56 26	33	Slightly.
"	" 18..	" 21..	95	40 to 48	4,705	49 19	32	Considerably.
"	" 25..	" 24..	91	38 to 48	3,460	32 32	30 $\frac{3}{4}$	"

BARLEY SOWN AT DIFFERENT DATES.

Name of Variety.	When Sown.	Date of Ripening.	No. of days maturing.	Length of Straw.	Weight of Straw per acre.	Yield of Grain per acre.	Weight per bushel.	Rusted.
				Inches.	Lbs.	Bush lbs.		
Oderbruch.....	April 20..	July 15..	86	36 to 38	3,590	42 44	45 ³ / ₄	None.
"	" 27..	" 20..	84	36 to 40	3,320	40 20	42 ¹ / ₂	"
"	May 4..	" 24..	81	36 to 40	3,400	33 36	42 ³ / ₄	Considerably.
"	" 11..	" 29..	79	32 to 36	3,170	26 2	41 ¹ / ₂	"
"	" 18..	Aug. 2..	76	30 to 36	2,925	32 39	44 ¹ / ₂	"
"	" 25..	" 8..	75	30 to 33	3,155	26 7	43 ³ / ₄	"
Canadian Thorpe....	April 20..	July 29..	100	40 to 45	2,785	30 45	48	Slightly.
"	" 27..	Aug. 3..	98	40 to 46	2,925	32 24	49	"
"	May 4..	" 8..	96	35 to 39	2,405	20 35	47	Very slightly.
"	" 11..	" 12..	93	32 to 38	3,420	16 32	46	Badly.
"	" 18..	" 15..	89	30 to 38	3,680	23 16	44 ¹ / ₂	Considerably.
"	" 25..	" 20..	87	30 to 38	2,900	17 39	40	Badly.

SPRING WHEAT SOWN AT DIFFERENT DATES.

Stanley	April 20..	Aug. 3..	105	36 to 38	1,720	6 40	54 ³ / ₄	Very badly.
"	" 27..	" 10..	105	42 to 45	3,085	12 ..	55	Badly
"	May 4..	" 14..	102	40 to 45	2,745	9 20	56 ¹ / ₄	"
"	" 11..	" 20..	101	40 to 42	3,040	6 ..	55	"
"	" 18..	" 26..	100	38 to 42	3,130	6 20	58	"
"	" 25..	" 30..	97	18 to 36	3,680	7 50	56 ¹ / ₂	"
Red Fife.....	April 20..	" 11..	113	38 to 40	1,640	12 ..	56 ¹ / ₂	"
"	" 27..	" 14..	109	40 to 45	3,840	10 50	56	"
"	May 4..	" 19..	107	30 to 40	2,360	6 ..	56 ¹ / ₄	"
"	" 11..	" 25..	106	36 to 42	3,325	6 20	56 ¹ / ₄	"
"	" 18..	Sept. 1..	106	18 to 36	4,320	5 ..	56 ¹ / ₂	"
"	" 25..	" 4..	102	30 to 36	5,250	5 55	56 ³ / ₄	"

PEASE SOWN AT DIFFERENT DATES.

Mummy.....	April 20..	Aug. 13..	115	55 to 60	3,820	39 40	63 ¹ / ₂	
"	" 27..	" 17..	112	55 to 60	3,380	30 40	62 ¹ / ₄	
"	May 4..	" 20..	108	55 to 60	3,985	39 55	62 ³ / ₄	
"	" 11..	" 23..	104	55 to 60	4,415	28 5	61 ³ / ₄	
"	" 18..	" 29..	103	55 to 60	3,970	24 10	62 ¹ / ₄	
"	" 25..	Sept. 3..	101	55 to 60	4,105	23 35	63	
Golden Vine.....	April 20..	Aug. 12..	114	55 to 60	3,295	38 40	62 ¹ / ₂	
"	" 27..	" 17..	112	55 to 60	3,385	36 55	62 ¹ / ₄	
"	May 4..	" 19..	107	55 to 60	4,080	37 20	62 ¹ / ₂	
"	" 11..	" 22..	103	55 to 60	3,980	26 10	63	
"	" 18..	" 29..	103	55 to 60	4,750	25 50	63 ³ / ₄	
"	" 25..	Sept. 3..	101	55 to 60	4,355	20 55	63 ¹ / ₂	

The very small yield of Stanley wheat from the first sowing was mainly due to the fact that it was almost destroyed by rust, and the comparatively low yields throughout, both of the Stanley and Red Fife wheats may be attributed to the same cause. The heavy yields of straw from the 6th sowing of Stanley and the 5th and 6th sowings of Red Fife was due to the very strong growth of weeds on these plots.

EXPERIMENTS WITH INDIAN CORN.

Twenty-seven varieties of Indian corn were tested side by side on sandy loam. The previous crop was oats. This land received a dressing of barn-yard manure in 1892, no fertilizer has since been applied. It was ploughed in the autumn of 1894 about 8 inches deep, and gang-ploughed in the spring and harrowed with the smoothing harrow before sowing. All the plots were sown on May 23rd in hills 3 feet apart each way, four or five kernels being placed in each hill. The yield per acre has been estimated from the yield of two rows of hills each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	Description of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Condition When cut.	Weight per Acre grown in hills.
Rural Thoroughbred White Flint.....	Very strong..	White flint.	Inches. 108 to 132...	Very leafy..	Aug. 9..	Aug. 14..	.....	Nearly in late milk	Tons. Lbs. 37 470
Giant Prolific Ensilage.....	"	White dent.....	120 to 138...	"	do	"	.....	Almost in early milk.	28 1970
Sanford White Flint.....	"	White flint	96 to 108...	"	July 30.	"	Sept. 4.	Late milk.	23 1300
Canadian White Flint.....	"	"	"	"	"	"	Aug. 29.	"	23 750
Champion White Pearl.....	"	White dent.....	108 to 126...	Fairly	Aug. 7.	"	Sept. 6.	Early milk..	23 200
Red Cob Ensilage.....	"	"	114 to 126...	"	"	"	.....	"	22 1320
Livingston's Gold Coin.....	"	Yellow dent	96 to 108...	Very	"	"	.....	"	22 1100
White Cap Yellow Dent.....	Strong	Yellow and white dent	108 to 114...	Fairly	July 30.	"	Sept. 3.	Late milk..	22 990
Early Mammoth Sugar.....	Very strong..	Sugar corn	108 to 114...	Very	Aug. 7.	"	"	Early milk..	20 1800
Country Gentleman.....	Strong	White dent	96 to 102...	"	"	"	6.	"	18 1400
North Dakota (C. E. F., seed)	"	Pink and white flint..	.....	Fairly	July 23.	July 28.	Aug. 26.	Nearly ripe.	18 520
Gold Medal Dent.....	"	Red and yellow dent..	96 to 108...	"	"	Aug. 8.	Sept. 3.	Late milk..	17 1640
Compton's Early (McDonald).	"	Yellow flint	96 to 102...	"	"	Aug. 30.	Aug. 29.	Nearly ripe.	17 1420
No. 5 from Minnesota.....	Fairly strong.	Red and yellow dent..	102 to 108...	Very	"	Aug. 6.	Sept. 1.	Early milk..	17 1420
Compton's Early (Steele).....	Very strong..	Yellow flint.....	6 to 102...	Fairly	"	Aug. 29.	Aug. 26.	Late milk..	17 1200
Angel of Midnight.....	"	"	102 to 114...	Very	"	"	"	"	17 100
No. 13 from Minnesota.....	Strong..	Red and yellow dent..	96 to 108...	Fairly	"	Aug. 30.	"	"	16 450
Mammoth Yellow Flint.....	"	Yellow flint.....	90 to 96...	"	"	Aug. 30.	"	Nearly ripe.	15 1900
Longfellow (McDonald).....	"	"	90 to 102...	"	"	"	"	"	15 1680
" (Pearce).....	Fairly strong.	"	90 to 102...	"	"	"	"	"	15 140
No. 39 from Minnesota.....	Strong..	White dent.....	96 to 108...	"	"	"	"	"	15 140
North Dakota (Brandon seed)	Medium.....	Pink and white flint..	72 to 84...	"	"	"	"	Late milk..	14 1700
Extra Early Huron Dent.....	Strong.....	Red and yellow dent..	96 to 108...	"	"	"	"	Nearly ripe.	14 1150
Canadian Dent.....	"	"	90 to 102...	"	"	Aug. 30.	"	"	14 1150
Pearce's Prolific.....	"	Yellow flint.....	96 to 102...	"	"	Aug. 30.	"	Nearly ripe.	14 50
Mitchell's Early.....	Medium	White flint.....	54 to 72...	"	"	July 18..	"	"	13 1280
White Flint from Vilmorin.....	"	"	.....	"	"	"	11..	"	10 1670

The varieties under numbers from Minnesota are new western sorts kindly sent for test by Prof. W. M. Hays, of the Experiment Station, St. Anthony's Park, Minn.

FIELD CROPS OF CORN.

These were all on sandy loam which varied from light to a somewhat heavy character. The previous crop was oats. This land received a light coating of barn-yard manure in the spring of 1895, about 12 tons to the acre. It was ploughed in the autumn of 1894, about 8 inches deep and ploughed again lightly in the spring, after the manure was spread and harrowed before sowing. The corn on all these plots was sown with a seed drill in rows three feet apart, on the 30th May, it came up on the 6th June, and was cut on the 12th September and following days.

Rural thorough-bred White Flint.— $2\frac{1}{2}$ acres. Yield per acre, 16 tons 1105 lbs.

Sanford Flint.— $\frac{1}{2}$ acre. Yield per acre, 16 tons 780 lbs.

Extra Early Huron Dent.— $\frac{1}{2}$ acre. Yield per acre, 13 tons 1,000 lbs.

Canadian Dent.— $\frac{1}{2}$ acre. Yield per acre, 15 tons 1,540 lbs.

Canadian White Flint.— $\frac{1}{2}$ acre. Yield per acre, 17 tons 1,460 lbs.

Champion White Pearl.— $\frac{1}{2}$ acre. Yield per acre 17 tons, 862 lbs.

New White Cap Yellow Dent.— $\frac{1}{2}$ acre. Yield per acre, 17 tons 1,800 lbs.

EXPERIMENTS WITH HORSE BEANS.

Two acres of horse beans were sown, with the variety known as "tick"; on one acre the seed was of Canadian growth having been produced at the Central Experimental Farm last year, the other acre was sown with imported seed. The soil was a sandy loam of rather poor quality which had received no fertilizer since the spring of 1892, when it had a dressing of barn-yard manure. The land was ploughed in the autumn of 1894, about 8 inches deep and gang-ploughed in the spring of 1895, and harrowed with the smoothing harrow before sowing. The seed was put in with the drill in rows three feet apart, about 45 lbs. of seed being used per acre. Sown 11th May, came up 27th May, and was cut green for the silo on 11th September. The yield per acre from the seed of Canadian growth was 6 tons 162 lbs., while the crop grown from the imported seed gave a return of 8 tons 390 lbs. The plants from the Canadian grown seed grew to a height of 48 to 50 inches, and were well podded with beans nearly ripe when the crop was cut, the leaves however were badly blighted. Those grown from imported seed attained a height of 50 to 60 inches, there was less blight on the leaves, the stems were well podded, but the crop was not so far advanced towards maturity at the time of cutting.

EXPERIMENTS WITH BUCKWHEAT.

One variety of buckwheat only has been tested this season, viz., the common black hulled buckwheat.

Three plots were sown at intervals. The first of these measuring one acre was sown on the 16th June, one peck of seed per acre, came up 23rd June, was in bloom 18th July and ripe on 29th August. The time to mature was 74 days. Yield per acre 27 bushels 16 lbs., growth strong and even.

The second plot which measured $1\frac{3}{4}$ acres was sown on 6th July, one peck per acre, came up 13th July, and was in bloom 12th August. When about two-thirds ripe a heavy frost occurred on 14th September, which discoloured the unripe seed and prevented further growth. This materially lessened the yield which was 21 bushels 37 lbs. per acre.

The third plot which occupied about one acre was sown on 16th July. It came up 21st July and was in bloom 20th August. but was cut by frost 14th September before any of the seed had ripened. This was ploughed under as a green manure. The main object in view in sowing these plots at successive periods was to ascertain their value when in blossom for honey production. This is reported on in connection with experiments carried on in the Apiary.

EXPERIMENTS WITH TURNIPS.

Thirteen varieties of turnips were tested on plots adjoining each other, all having similar treatment. The soil was sandy loam, the previous crop was oats. This land was manured in 1893 with about 18 tons of barn-yard manure per acre, followed by a crop of pease. It was gang-ploughed shallow early in the autumn of 1894 to cover and germinate weed seeds and ploughed again later in the season about 8 inches deep. In the spring of 1895 it was gang-ploughed and harrowed with the smoothing harrow and rolled before sowing. The seed was sown on the flat in rows 2½ feet apart and the yield of the crop in each case has been calculated from the quantity obtained from two rows, each 66 feet long, two sowings were made of each sort of seed, the 1st on 25th May, the second on 12th June, and the roots on both were pulled on the 8th October.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Lord Derby	12	1,080	418		13	1,720	462	
From John Killam, Kingston, N.S.	12	288	404	48	17	1,112	585	12
Imperial Swede	9	480	308		14	908	481	48
Giant King	8	38	267	18	12	288	404	48
Hartley's Bronze Top	7	1,312	255	12	5	1,088	184	48
Elephant's Master	5	1,352	189	12	15	624	510	24
Carter's Elephant	5	890	181	30	13	1,984	466	24
Jumbo or Monarch	4	1,042	150	42	10	64	334	24
Purple Top Swede	4	778	146	18	12	24	400	24
East Lothian	3	1,656	127	36	6	1,728	228	48
Skirving's Swede	3	1,194	119	54	14	776	479	36
Champion Purple Top	3	1,128	118	48	17	1,904	598	24
Rennie's Prize Purple Top	3	864	114	24	8	1,160	286	

Most of the varieties of turnips in the above tests were more or less affected with rot, some of them very badly. This disease has been disastrous to the turnip crop in many instances in the Ottawa district for some years past, and the very small yields reported from some varieties especially those from the first sowing were largely the result of this disease. In some instances the yield was further lessened by the destruction of many of the young plants by insects.

FIELD CROP OF TURNIPS.

Elephant's Master.—One acre. Soil partly sandy loam mixed with clay and partly peat. The previous crop was oats. This land received a dressing of barn-yard manure in 1892. It was ploughed in the autumn of 1894 about 8 inches deep and gang-ploughed in the spring of 1895, and harrowed with the smoothing harrow before sowing. Sown 13th June on drills 2½ feet apart, about 3 lbs. of seed per acre, came up 18th June, and were pulled 18th October. Yield per acre, 15 tons 1425 lbs., made a fairly even growth, there was no rot but the plants were troubled more or less with the turnip aphid.

EXPERIMENTS WITH MANGELS.

Thirteen varieties of mangels were tested side by side. The land on which they were grown was adjoining that used in the test of varieties of turnips, and the soil and treatment was the same. The previous crop was oats. The seed was sown on the flat in rows 2½ feet apart in the proportion of 3 to 4 lbs. per acre. Two sowings were made in each case, the first on the 11th May, the second on 25th May, and both were pulled on 8th October.

The earliest sown plots have again given much the largest yields. The returns given have been calculated from the weight of roots obtained from two rows each 66 feet long.

MANGELS—TEST OF VARIETIES.

Name of Variety.	Yield per acre.		Yield per acre.		Yield per acre.		Yield per acre.	
	1st Plot.		1st Plot.		2nd Plot.		2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth Long Red (Evans)	37	976	1249	36	22	880	748	
Red Fleshed Tankard	33	528	1108	48	19	1336	655	36
Mammoth Long Red (Sharpe).....	32	1208	1086	48	19	1666	661	6
Giant Yellow Intermediate	31	634	1043	54	19	1600	660	0
Champion Yellow Globe.....	29	1400	990		19	16	633	36
Mammoth Long Red (Webb).....	29	146	969	6	16	1066	551	6
Canadian Giant.....	28	1288	954	48	23	1520	792	0
Conqueror Yellow Globe.....	28	1090	951	30	17	848	580	48
Mammoth Long Red (Steele)	27	1176	919	36	17	56	567	36
Gate Post.....	27	1176	919	36	17	1376	589	36
Red Fleshed Globe.....	24	1896	831	36	22	880	748	0
Warden Orange Globe.....	24	1368	822	48	16	208	536	48
Golden Tankard.....	22	682	744	42	17	1640	594	

FIELD CROPS OF MANGELS.

Two varieties of mangels were grown on plots of one acre each. These were sown adjoining the field crops of turnips, and the land was similar in character, but a little more peaty. The treatment and preparation of the land was the same.

Mammoth Long Red (Evans).—One acre, sown May 13th, 3 to 4 lbs. per acre on drills 2½ feet apart, came up 26th May, and were pulled 10th October. Yield per acre 15 tons 260 lbs. Growth strong, but uneven, owing to many of the young plants having been eaten by insects.

Mammoth Long Red (Sharpe.) One acre, sown 13th May, 3 to 4 lbs. per acre on drills 2½ feet apart, came up 26th May, and were pulled 11th October. Yield per acre, 14 tons 1,500 lbs. Growth strong, but uneven, as many of the young plants in this instance also were eaten by insects.

EXPERIMENTS WITH CARROTS.

Twelve varieties of carrots were sown side by side adjoining the plots used for test of varieties of turnips. The soil and treatment of the land was the same. The carrots were sown on the flat in rows two feet apart, 3 to 4 lbs. of seed being used per acres Two plots of each sort were sown, the first on the 11th May, and the second on 25th May, and the roots on both were pulled on 8th October. The yield in each instance has been calculated from the weight of crop gathered from two rows, each 66 feet long. In this case also the earlier sown plots have averaged a considerably larger yield than those sown later.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Pilot.		Yield per Acre. 1st Pilot.		Yield per Acre. 2nd Pilot.		Yield per Acre. 2nd Pilot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth White Intermediate.....	29	1,400	990		25	820	847	
Improved Half Long White....	27	1,935	932	15	23	1,520	792	
Iverson's Champion.....	26	1,130	885	30	26	1,295	888	15
Early Gem.....	24	262	804	22	14	1,782	496	22
White Belgian.	23	530	775	30	14	50	467	30
Carter's Orange Giant.....	23	282	771	22				
Giant Short White Vosges.....	22	1,870	764	30	20	260	671	
Improved Short White.....	22	880	748		20	1,580	693	
Yellow Intermediate.....	21	570	709	30				
Long Scarlet Altringham.....	15	1,020	517		9	1,140	319	
Long Orange or Surrey.....	11	1,100	385		7	932	248	52
Scarlet Altringham (Webb).					10	790	346	30

Three of the plots of carrots are not reported on. The seed of the Scarlet Altringham in the first sowing was not received in time to be sown with the others, and two of the plots in the second sowing were almost an entire failure either from lack of germination of the seed or the destruction of the young plants from some unknown cause, so that they were of no value for comparison.

FIELD CROP OF CARROTS.

One acre only was sown as a field crop. The variety used was the Improved Short White. The soil was a mixture of sandy and clay loam, which had received no fertilizer since the spring of 1892. The land was ploughed in the autumn of 1894 about 8 inches deep, and gang-ploughed in the spring following and harrowed with the smoothing harrow before sowing. Sown 13th May; 3 to 4 lbs. of seed per acre; on drills $2\frac{1}{2}$ feet apart; came up 27th and 28th May, and were pulled 18th October. Yield per acre, 18 tons 1525 lbs. Growth medium, but even in character.

EXPERIMENTS WITH POTATOES.

Ninety-one varieties of potatoes have been tested during the past season side by side, for the purpose of gaining information as to their relative yield, earliness and quality. The soil in which they were planted was sandy loam, adjoining that used for the tests of varieties of Indian corn. The land was similar in character, and had the same treatment.

The potatoes for planting were cut into pieces with from two to three eyes in each, and were planted in rows $2\frac{1}{2}$ feet apart, with the sets about a foot apart in the rows. They were all planted from the 22nd to the 25th of May, and were dug October 2nd. The yield per acre has been calculated from the weight of tubers obtained from one row, 132 feet long. It will be seen that rot prevailed to a greater or less extent in nearly all the varieties tested.

All the varieties were sprayed once with Bordeaux mixture during the first week in August, probably the heavy rains which occurred about that time may have prevented this useful fungicide from exercising its usual beneficial action on this formidable disease.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	
American Wonder.....	385		341	..	44	..	299	12	41	48	White.
Rochester Rose.....	381	8	315	48	65	20	283	8	32	40	Pink.
Early Norther.....	378	24	354	12	24	12	303	36	50	36	Pink and white.
Irish Daisy.....	366	37	366	37	.....	.....	319	26	47	11	White.
General Gordon.....	365	12	341	..	24	12	301	24	39	36	Pink.
Early White Prize.....	363	..	328	58	34	2	297	12	31	46	White.
New Queen.....	363	..	331	14	31	46	304	1	27	13	Pink and white.
Hale's Champion.....	358	36	352	..	6	36	310	12	41	48	White.
Henderson's Late Puritan.....	355	44	355	44	.....	.....	304	55	50	49	"
Early Harvest.....	353	55	308	33	45	22	267	43	40	50	"
Thorburn.....	352	..	327	48	24	12	281	36	46	12	Pink and white.
Queen of the Valley.....	347	36	242	..	105	36	235	24	6	36	Pink.
I. X. L.....	347	36	283	48	63	48	255	12	28	36	Pink and white.
Empire State.....	347	36	310	12	37	24	286	..	24	12	White.
Reading Giant.....	347	36	344	18	3	18	308	..	36	18	"
Clarke's No. 1.....	341	..	305	48	35	12	272	48	33	..	Pink.
Early Rose.....	327	48	312	24	15	24	272	48	39	36	"
Burnaby Seedling.....	323	24	288	12	35	12	257	24	30	48	Pink and white.
Everett.....	323	24	268	24	55	..	239	48	28	36	Rose.
Monroe County.....	321	12	281	36	39	36	235	24	46	12	Pink.
White Beauty.....	312	24	297	..	15	24	279	24	17	36	White.
American Giant.....	312	24	235	24	77	..	209	..	26	24	"
Maggie' Murphy.....	312	10	261	21	50	49	246	50	14	31	Bright pink.
Early Six Weeks..	310	48	256	21	54	27	229	8	27	13	Pink.

POTATOES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Market- able.		Yield per Acre of Unmark- etable.		Colour.
	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	
Prize Taker.....	297	12	276	57	20	25	235	57	40	50	Pink.
Earliest of All.....	297	..	290	24	6	36	244	12	46	12	Pink and white.
Vick's Extra Early.....	294	48	242	..	52	48	215	36	26	24	"
Daisy.....	290	24	264	..	26	24	226	36	37	24	"
Burpee's Extra Early.....	290	24	255	12	35	12	209	..	46	12	"
Early Puritan.....	290	23	263	10	27	13	222	20	40	50	White.
Sharpe's Seedling.....	283	48	264	..	19	48	231	..	33	..	Pink and white.
Flemish Beauty Seedling.....	283	48	257	24	26	24	224	24	33	..	Bright pink.
Polaris.....	281	36	259	36	22	..	228	48	30	48	White.
Russell's Seedling.....	279	24	231	..	48	24	181	30	49	30	White.
Pride of the Market.....	279	24	231	..	48	24	200	12	30	48	"
Pearce's Extra Early.....	279	24	255	12	24	12	211	12	44	..	Pink and white.
Russell's Seedling.....	277	12	253	..	24	12	171	36	81	24	White.
Seedling No. 230.....	277	12	261	48	15	24	204	36	57	12	"
Lee's Favourite.....	275	..	242	..	33	..	215	36	26	24	Pink.
Delaware.....	275	..	261	48	13	12	235	24	26	24	White.
Brown's Rot Proof.....	273	54	259	36	14	18	226	36	33	..	Pink.
Seedling No. 2, R. Edwards.....	268	24	268	24	.....	.....	226	36	41	48	White.
Troy Seedling.....	267	42	240	29	27	13	204	11	36	18	
Holborn Abundance.....	264	..	253	..	11	..	217	48	35	12	"
McKenzie.....	261	48	253	..	8	48	217	48	35	12	"
Seattle.....	261	48	237	36	24	12	206	48	30	48	"
Pride of the Table.....	261	48	167	12	94	36	143	..	24	12	Pink.
State of Maine.....	259	36	236	30	23	6	215	36	20	54	White.
Seedling No. 214.....	259	36	255	12	4	24	211	12	44	..	"
Great Divide.....	258	38	224	36	34	2	183	46	40	50	"
Money Maker.....	256	22	233	41	22	41	220	4	13	37	"
Chicago Market.....	255	12	215	36	39	36	187	..	28	36	Pink
Crown Jewel.....	250	48	224	24	26	24	178	12	46	12	Pink and white.
Ideal.....	249	33	158	48	90	45	149	44	9	4	Pink.
Early Ohio.....	244	12	204	36	39	36	193	36	11	..	"
Algoma No. 1.....	244	12	206	48	37	24	184	48	22	..	"
Early Sunrise.....	239	48	193	36	46	12	165	..	28	36	"
Lizzie's Pride.....	239	48	182	36	57	12	158	24	24	12	Pink, red eye.
Harbinger.....	233	12	228	48	4	24	184	48	44	..	Pale pink.
London.....	231	..	220	..	11	..	178	12	41	48	Pink.
Freeman.....	231	..	231	..	.....	.....	165	..	66	..	White.
Rural Blush.....	229	54	210	6	19	48	190	18	19	48	Pink.
Brownell's Winner.....	226	52	199	39	27	13	181	30	18	9	Red.
Dreer's Standard.....	226	36	213	24	13	12	180	24	33	..	White.
Early Thorburn.....	226	36	202	24	24	12	173	48	28	36	Pink and white.
Satisfaction.....	225	30	218	54	6	36	194	42	24	12	White.
Seedling No. 3, R. Edwards.....	223	18	220	..	3	18	194	42	25	18	"
Dakota Red.....	220	..	220	..	.....	.....	200	12	19	48	Red.
Carman No. 1.....	220	4	204	11	15	53	183	46	20	25	White.
Blue Cup.....	220	..	209	..	11	..	193	36	15	24	Purple and white
Northern Spy.....	217	48	211	12	6	36	167	12	44	..	Bright pink.
Beauty of Hebron.....	209	..	191	24	17	36	154	..	37	24	Pink and white.
Vanier.....	209	..	209	..	..	..	167	12	41	48	Red.
Green Mountain.....	204	36	187	..	17	36	176	..	11	..	White.
Table King.....	200	12	198	..	2	12	167	12	30	48	"
Early Gem.....	199	6	173	48	25	18	145	12	28	36	Pink.
Hopeful.....	198	..	193	36	4	24	167	12	26	24	White.
Peerless Junior.....	196	2	174	15	21	47	152	28	21	47	"
Victor Rose.....	195	7	140	40	54	27	127	3	13	37	Pink.
Clay Rose.....	195	7	190	35	4	32	156	33	34	2	"
Chas. Downing.....	194	42	178	12	16	30	134	12	44	..	White.
New Variety No. 1.....	187	..	179	18	7	42	166	6	13	12	"
Orphan's.....	177	39	173	7	4	32	120	15	52	52	Purple and white
Bras d'Or Seedling.....	176	..	158	24	17	36	134	12	24	12	Purple.
E. Lortie, from.....	162	48	160	36	2	12	110	..	50	36	
Martin's.....	155	6	146	18	8	48	103	24	42	54	Purple.
Seedling from T. McMurray, North Bay.....	154	..	125	24	28	36	94	36	30	48	Pink.
Record.....	149	44	.....	.....	.....	.....	.....	.....	.....	.....	White.
World's Fair.....	144	6	124	18	19	48	89	6	35	12	"
Pearce's Prize Winner.....	138	36	127	36	11	..	110	..	17	36	Pink.
Stourbridge Glory.....	133	51	.....	.....	.....	.....	.....	.....	.....	.....	White.

FIELD CROPS OF POTATOES.

The following varieties of potatoes have been planted side by side, all on the same soil. The soil was a light sandy loam, which was manured in the spring of 1893, with about 18 to 20 tons of barn-yard manure per acre. The previous crop was corn. The land was ploughed in the autumn of 1894, about eight inches deep, and gang-ploughed and harrowed with the smoothing harrow in 1895 before sowing. The potatoes were all planted in drills, 2½ feet apart, with the sets containing from two to three eyes each, 12 to 14 inches apart. The growth of all the varieties was fairly even and there was very little rot in any of them. They were all planted 25th May, came up 7th June, and were dug 27th September.

	Acres.	Yield per acre.	
Daisy.....	$\frac{1}{16}$	239 bushels	40 pounds.
Northern Spy.....	$\frac{1}{10}$	236	" 56 "
Dakota Red.....	$\frac{1}{11}$	232	" "
New Variety No. 1.....	$\frac{1}{11}$	225	" 18 "
Empire State.....	$\frac{1}{13}$	222	" 28 "
Everett.....	$\frac{1}{7}$	214	" 39 "
Rural Blush.....	$\frac{1}{14}$	200	" 41 "
Early Rose.....	$\frac{1}{18}$	199	" 37 "
Pearce's Extra Early.....	$\frac{1}{12}$	196	" 9 "
McKenzie.....	$\frac{1}{16}$	194	" 20 "
Clarke's No. 1.....	$\frac{1}{17}$	192	" 28 "
Early Sunrise.....	$\frac{1}{13}$	191	" 54 "
London.....	$\frac{1}{8}$	183	" 55 "
Chicago Market.....	$\frac{1}{9}$	179	" 55 "
Early Ohio.....	$\frac{1}{14}$	155	" 47 "

EXPERIMENTS WITH SUGAR BEETS.

Four varieties of sugar beets were sown in plots of ¼th acre each, adjoining the field crop of carrots, on similar land, with the same treatment. These were all sown on drills 2½ feet apart, and the quantity of seed used in each case was from 3 to 4 lbs. per acre.

Vilmorin's Improved.—¼ acre. Sown 13th May; came up 26th May, and were pulled 21st October. Yield per acre, 9 tons 1810 lbs.

French White.—¼ acre. Sown 13th May; came up 26th May, and were pulled 21st October. Yield per acre, 10 tons 1170 lbs.

German White.—¼ acre. Sown 13th May, came up 26th May, and were pulled 21st October. Yield per acre, 9 tons 1406 lbs.

Klein Wanzleben.—¼ acre. Sown 13th May, came up 26th May, and were pulled 21st October. Yield per acre, 12 tons 810 lbs.

SUMMARY of Crops grown on the Central Experimental Farm during the year 1895.

	Tons.	Lbs.		Bush.	Lbs.
Hay	149	.....	Wheat.....	219	43
Indian corn cut for ensilage.....	274	1154	Rye.....	241	.....
Indian corn cut when cobs were nearly ripe and cured in stooks for winter feeding.....	25	544	Oats.....	2,478	14
Indian corn and horse beans grown together and cut for ensilage.....	74	1769	Barley.....	667	25
Horse beans grown separately and cut for ensilage.....	44	1367	Pease.....	250	59
Mixed crop cut and cured as hay.....	33	385	Buckwheat.....	67	14
Sunflower heads.....	16	791	Potatoes.....	762	10
Turnips.....	24	808	English horse beans.....	26	50
Carrots.....	74	1219			
Mangels.. ..	95	747		4,713	35
Sugar beets.. ..	10	1279			
	823	18			

EXPERIMENTS WITH CLOVERS.

The different varieties of clover have long been held in high esteem by practical farmers in all parts of the world as most useful plants to plough under as green manure for the benefit of future crops. Much interest has of late been awakened in this subject, it having been shown that clovers in common with most other leguminous plants have the power of taking nitrogen—the most expensive of all fertilizers to buy—from the air and of storing it up in their tissues. Some experiments have recently been tried at the Central Experimental Farm to determine approximately the quantity of nitrogen which may be added to the soil per acre by ploughing under a crop of green clover.

A field which was sown with barley—a two-rowed variety (Canadian Thorpe)—in the spring of 1894, was at the same time seeded down with Mammoth Red Clover. After the barley was harvested the clover grew rapidly and made a good stand before winter. By the third week in May, about the time when such a crop should be ploughed under for corn or potatoes, the clover was quite heavy. On the 25th of May, a box a foot square inside and four feet deep was sunk to its full depth into the crop, and by lifting it carefully a fair sample of clover with roots to the depth named was obtained. On washing away the earth some of the roots were found to extend down fully four feet and had thus been able to feed on stores of fertility in the lower depths of the subsoil, beyond the reach of other crops with a less extensive root system, and to transfer these to the leaves and stalks. In this crop of one year's growth, the green leaves and stems were separated from the partly decayed leaves about the base, and also from the roots, and each weighed and analysed separately by the Chemist of the Experimental Farms. The proportion of nitrogen in pounds per acre found in these different parts of the crop was as follows:—

Green leaves and stems.....	101·3 lbs. per acre.
Semi-decayed material on surface.....	22·5 “
Roots to a depth of four feet.....	48·5 “
<hr/>	
Total.....	172·3 “

A similar test was also made on a crop of two years' growth on 25th May, with the following results:—

Green leaves and stems.....	50·0 lbs. per acre.
Semi-decayed material on surface.....	5·1 “
Roots to a depth of four feet.....	61·5 “
<hr/>	
Total.....	116·6 “

In both these fields timothy had been sown with the clover in the proportion of 12 lbs. of the former to 8 lbs. of the latter. In the field of one year's growth, the timothy plants were quite small and formed a very small percentage of the whole, but in the crop of the second year the timothy plants were much stronger and larger, and formed a much larger proportion of the green growth. The fact that the timothy plants formed so large a part of the crop explains why the total quantity of nitrogen was so much less in the crop of the second year than it was in that of the first.

Experiments have been carried on with clover and other legumes for some years past at the Connecticut Experiment Station at Storrs, Conn., and the following figures give the results from four analyses made there of red clover in which the proportions of the two other important fertilizing constituents, phosphoric acid and potash are given also in pounds per acre:—

	Nitrogen.	Phos. Acid.	Potash.
Green leaves and stems.....	114·0	23·0	123·0
Stubble and roots.....	44·3	12·5	32·2
<hr/>		<hr/>	<hr/>
Total.....	158·3	35·5	155·2

While some of the nitrogen stored up is no doubt taken from the soil, a large proportion of it is gathered from the air in which unlimited stores exist. It must be borne in mind that the phosphoric acid and potash are taken by clovers entirely from the soil, but as the root system extends deep and wide, stores are gathered which other plants do not reach, and these are laid up in the tissues, and when ploughed under are soon converted into plant food available for succeeding crops.

In the Annual Report of the Experimental Farms for 1893, page 7, the quantities of these three important elements of fertility, which are taken from the soil by some of the more important agricultural crops, have been given in lbs. per acre, others are added here.

	Nitrogen.	Phos. Acid.	Potash.
A wheat crop of 25 bushels per acre with 2,200 lbs. of straw takes about.....	40.53	17.64	19.11
A barley crop of 35 bushels per acre with 2,000 lbs. of straw takes	45.48	17.14	28.25
A crop of oats of 50 bushels per acre with 2,200 lbs. of straw takes.....	46.3	15.22	32.88
A crop of Indian corn grown for fodder to the period when the ears are in the late milk or glazing stage of 15 tons per acre takes..	87.	44.40	98.10
Turnips, roots only 15 tons per acre	49.50	27.90	82.50
Mangels, roots only 15 tons per acre	45.45	27.60	114.90
Carrots, roots only 15 tons per acre.....	35.25	33.30	97.95
Sugar beets, roots only 15 tons per acre.....	71.85	28.80	135.90
Potatoes, tubers only, 200 bush. per acre.....	25.20	8.40	*34.80
Hay, average of many analyses, two tons per acre.....	62.	16.40	52.80

From these figures the importance of the clover crop as a fertilizer will be readily seen.

GREEN CLOVER AS A FERTILIZER COMPARED WITH BARN-YARD MANURE.

The question naturally arises in this connection: How does a crop of green clover with such weight of roots and stems as those referred to compare with a dressing of barn-yard manure?

Manure from the barn-yard varies so much in quality that it is not possible to give exact information in reply. The results of a large number of analyses show that manure of good quality usually contains per ton from 10 to 12 lbs. of nitrogen, 5 to 15 lbs. of phosphoric acid, and 7 to 15 lbs. of potash. The average of a very large number of determinations as given in a "Handbook of Experiment Station Work," published by the U.S. Department of Agriculture, is nitrogen 9.80 lbs. per ton, phosphoric acid 6.40 lbs. and potash 8.60 lbs. Calculated on the basis of these latter figures the average crop of clover had at the Connecticut Experiment Station, with tops and roots both ploughed under, would provide in the soil more nitrogen and potash than 15 tons of barn-yard manure, and more phosphoric acid than 5 tons of such manure.

* The figures here given have been taken from the "Handbook of Experiment Stations Work" of the U. S. Department of Agriculture, 1893. Some other authorities give the proportion of potash as much larger. The New York Experimental Station in Bulletin 94, Oct., 1895, gives 60 lbs. of potash as the quantity taken up by 200 bushels of potatoes.

DOES CLOVER SOWN WITH GRAIN LESSEN THE YIELD.

A further important question suggests itself, can clover be grown to advantage with grain from year to year without materially lessening the crop? If this can be done, the clover will also serve as an excellent catch crop, absorbing and appropriating the nitrogenous fertilizers brought down by the rain during the late months of autumn, and may be ploughed under at the close of the season, with great advantage to the land. Should this course be adopted, what quantity of clover seed should be sown per acre and what kinds of clover are best for the purpose.

A course of experiments has been planned and carried out during the past season, to gain information on these points. A field of nearly two acres was selected for this purpose, the soil was a sandy loam which appeared to be fairly uniform, but was of poor quality. It was sown with wheat in 1894 and gave a light crop. It was ploughed in the autumn of 1894, and received a dressing of wood ashes, about 150 bushels per acre, during the following winter, applied when the ground was bare. The land was gang-ploughed in the spring of 1895, and harrowed with the smoothing harrow before sowing. This area was divided into 18 plots of one-tenth acre each, with three feet of space all around each plot, and the whole sown on 3rd May, with two-rowed barley, Canadian Thorpe, two bushels per acre. This came up on the 8th of May and was harvested 5th August, ripened evenly, all standing well. On the 9th of May the clover was sown and the land rolled. The quantities and kinds of clover seed used were as follows and the several plots gave the following yields of barley :—

	Yields of Barley	
	per acre.	
	Bush.	Lbs.
No. 1—2 lbs. Mammoth Red Clover per acre.....	16	37
“ 2—Was a check plot, had no clover.....	19	18
“ 3—4 lbs. Mammoth Red Clover per acre.....	19	23
“ 4—6 “ “ “ “	19	8
“ 5—8 “ “ “ “	18	21
“ 6—10 “ “ “ “	18	41
“ 7—A check plot, no clover sown	19	8
“ 8—12 lbs. Mammoth Red Clover per acre.....	21	7
“ 9—14 lbs. “ “ “ “	26	22
“ 10—16 lbs. “ “ “ “	22	14
“ 11—A check plot no clover sown.....	19	13
“ 12—8 lbs. Lucerne Clover.....	18	21
“ 13—8 lbs. Alsike Clover.....	23	16
“ 14—8 lbs. Crimson Clover.....	16	2
“ 15—8 lbs. Cow Grass.....	15	30
“ 16—8 lbs. Mammoth Red Clover.....	16	22
“ 17—A check plot, no clover sown.....	18	26
“ 18—8 lbs. Mammoth Red Clover.....	16	32

In most instances those plots which gave the lesser yields of grain were a little lower than the others which as there was an unusual rainfall at Ottawa during the growing season may account for this falling off. Taking the results of all the plots into consideration it does not appear that the yield of barley was materially influenced by the sowing of the clover with it. Part of the following notes were taken on the 4th of October, after which the land was ploughed 8 inches deep and a square block of the turned furrow cut out and the plants washed clean of earth, when further particulars were taken on the development of the roots ; these combined notes are here submitted.

No. 1, 2 lbs. Mammoth Red Clover seed per acre. Growth very thin and bunchy, height of plants 4 to 6 inches, the roots in this plot were strong and well developed.

No. 2, 4 lbs. Mammoth Red Clover seed per acre. Very bunchy and uneven, height 4 to 6 inches, roots strong and well developed with a larger proportion of small fibres than in No. 1.

No. 4, 6 lbs. Mammoth Red Clover seed per acre. Plants very much thicker and more even in growth and distribution than Nos. 1 and 2 but not thick enough to make good meadow, height 4 to 6 inches. Roots strong and well developed with a large proportion of small fibres.

No. 5, 8 lbs. Mammoth Red Clover seed per acre. A good even growth, ground fairly well covered with plants, thick enough to make a good meadow, but should be thicker for ploughing under first season. Roots strong and well developed with a large proportion of small fibres.

No. 6, 10 lbs. Mammoth Red Clover seed per acre. A good even growth, ground well covered forming an excellent mat 4 to 7 inches high, in good condition for ploughing under. Roots strong and well developed, many of them thick, with a large proportion of small fibres.

No. 8, 12 lbs. Mammoth Red Clover seed per acre. A very thick and even growth, thicker than is needed to make good meadow, a fine mat for ploughing under, height 4 to 7 inches. Roots strong and well developed, soil well filled with small fibres.

No. 9, 14 lbs. Mammoth Red Clover seed per acre. Growth very thick and even 5 to 8 inches high, suitable for fall feeding or ploughing under, too thick for meadow. Roots strong and well developed, soil very well filled with fine fibres.

No. 10, 16 lbs. Mammoth Red Clover seed per acre. Made a very thick mat of growth 5 to 8 inches high, excellent for fall feeding or ploughing under, too thick for meadow. Roots strong and well developed, the soil very well filled with fibres.

No. 12, 8 lbs. Lucerne per acre. Made a thin and uneven growth in bunches, not thick enough for meadow, stalks somewhat woody. Roots thick and strong with comparatively few fibres.

No. 13, 8 lbs. Alsike Clover per acre. The seeds of this variety of clover are small, and this quantity of seed was sufficient to produce a very thick and even growth, too thick a mat for meadow, in good condition for ploughing under, height 5 to 8 inches. A considerable part of this was in flower on 4th October, and bees were working on the flowers at that date. Root growth very strong, roots white, are thicker and more branching than other varieties and are well provided with fibres.

No. 14, 8 lbs. Crimson Clover. The seeds of this clover are large and the quantity sown was not sufficient to make a good stand. The growth was very uneven and weak, much too thin for ploughing under. Many of the plants were in flower on 4th October and bees were working among them. The roots were fairly well developed for an annual plant, they were not as strong as those of the other clovers, but were well provided with fibres, many of them extending down to the full depth of the furrow.

No. 15, 8 lbs. Cow Grass or Perennial Red Clover per acre. The seed of this clover is somewhat larger than that of the Mammoth Red, but the plants resemble this variety closely. In this case the seed did not germinate well and the growth was uneven, weak and patchy, not thick enough for meadow. As the yield of barley was less on this plot the land was probably poorer which may partly account for the weaker growth.

No. 16, 8 lbs. Mammoth Red Clover, Ewing's No. 1 per acre. This produced a very thick, even growth, height 4 to 7 inches, with a considerable quantity of bloom, in first-class condition for meadow or for ploughing under. This growth was thicker than No. 5 where the same quantity of seed was used; probably the seed in this instance was of better quality. Roots, strong and well developed with a very large proportion of fibres.

No. 17, 8 lbs. Mammoth Red Clover, Ewing's No. 2, produced a very thick and even growth, 4 to 7 inches high. A larger proportion of the plants in bloom than in No. 16, in very good condition for meadow or for ploughing under. Roots of medium size, well developed with a large proportion of fibres.

On a careful examination of the seeds of the different varieties of clover used in these experiments it was found that they varied more in size than was at first anticipated. In order to ascertain the approximate number of seeds in each pound, 20 grains of each

sort was accurately weighed on a chemical balance and the seeds counted. Taking 7,000 grains as equal to 1 lb. avoirdupois we find the approximate number of seeds of the different varieties referred to, in each pound to be as follows:—

	Number of seeds per lb.
Alsike Clover	693,350
Common Red Clover	282,800
Mammoth Red Clover, Ewing's No. 1.....	281,750
Mammoth Red Clover, Ewing's No. 2.....	281,400
Mammoth Red Clover	259,350
Cow Grass (Perennial Red Clover).....	227,150
Lucerne or Alfalfa	194,600
Crimson Clover.....	115,850
Timothy.....	1,020,950

Presuming these seeds all to have the same percentage of vitality or germinating power it will be seen that 1 lb. of Alsike would produce nearly as many plants as 2½ lbs. of Red Clover and more than 3½ lbs. of Lucerne or Alfalfa and more than would be produced by 5 lbs. of Crimson Clover. It would appear that in sowing clovers the quantity of seed used should be proportionate to the size of the seed in each case. On this basis presuming that 10 lbs of red clover per acre would be a proper quantity to sow with grain to produce a good mat of foliage to plough under in the autumn or following spring 5 lbs. of Alsike should be enough for a similar area, whereas sufficient seed to produce the same number of plants of Lucerne or Alfalfa would require about 14 lbs. and of Crimson Clover about 24 lbs. This subject is worthy of more general attention and careful test by farmers in all parts of the country.

TESTS OF THE ACTION OF FERTILIZERS ON SOME CROPS.

In the Annual Report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which were carried on during the previous five or six years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important crops. The particulars there given covered the results of six years' experience with crops of wheat and Indian corn, and five years' experience with crops of oats, barley, turnips and mangels. The results of similar tests conducted for three years with carrots and one year with sugar beets were also given.

These experiments have been continued; and as explanatory regarding the preparations made and the general plan, together with the way in which they have been carried on the following paragraphs are quoted from the report of 1893:

"A piece of sandy loam, more or less mixed with clay, which was originally covered with heavy timber, chiefly white pine, was chosen for these tests. The timber was cut many years ago, and among the stumps still remaining when the land was purchased, there had sprung up a thick second growth of trees, chiefly poplar, birch and maple, few of which exceeded six inches in diameter at the base. Early in 1887, this land was cleared by rooting up the young trees and stumps and burning them in piles on the ground from which they were taken, the ashes being afterwards distributed over the soil as evenly as possible, and the land ploughed and thoroughly harrowed. Later in the season it was again ploughed and harrowed, and most of it got into fair condition for cropping."

"The plots laid out for the experimental work with fertilizers were one-tenth of an acre each, 21 of which were devoted to experiments with wheat, 21 to barley, 21 to oats, 21 to Indian corn or maize, and 21 to experiments with turnips and mangels. Owing to the difficulty and unavoidable delay attending the draining of some wet places, it was not practicable to undertake work on all the plots the first season. The tests were begun in 1888 with 20 plots of wheat and 16 of Indian corn; and in 1889 all the

series were completed excepting six plots of roots, Nos. 16 to 21 inclusive, which were available for the work in 1890." In all cases the plots in each series have been sown on the same day.

"In 1890 it was found that all the grain plots had become so weedy that the growth of the crops was much interfered with, and with the view of cleaning the land one-half of each of the wheat and oat plots was sown with carrots in 1891, and one-half of each of the barley plots with sugar beets. In 1892 the other half of each plot in each of these series was sown with carrots. In 1893 it was thought desirable to continue this cleaning process, and carrots were again sown on the half of the wheat and oat plots occupied with this crop in 1891, and also on the half of the barley plots cropped with sugar beets that year." In 1894 and 1895, the one-half of the oat plots were sown again with carrots and the half of the plots devoted to wheat and barley were planted with potatoes.

"TREATMENT OF SOIL.

"The treatment of the soil on all the grain plots has been to gang-plough soon after harvest, and after the shed grain and weeds have well started to plough again about 7 inches deep. In spring the plots have been disc-harrowed twice or gang-ploughed once before applying the fertilizers, and again harrowed with the toothed or smoothing harrow before sowing. On those plots where barn-yard manure has been used, the manure has been lightly ploughed under as soon as possible after it has been spread on the land and harrowed with the smoothing harrow before sowing. Wherever barn-yard manure is spoken of, it is understood to be a mixture of horse and cow manure in about equal proportions."

It is proposed to give each year in the annual report a summary of these permanent fertilizer plots, taking the average yield of the whole of the previous period, adding the results of the current year, and then giving the average yield for the full time. The experience of each year will add materially to the value and reliability of the tests for the whole period.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of $1\frac{1}{2}$ bushels per acre, excepting in 1894; and the varieties used were as follows. In 1888-89 and '91 White Russian, and in 1892-93 Campbell's White Chaff. In 1894 the Rio Grande wheat was used, and shortly before sowing, it was tested as to vitality and found to be very deficient in germinating power, less than half the kernels sprouted. As it was not practicable then to secure better seed, double the usual quantity of seed was sown, namely: three bushels per acre, which gave a proportion of growth on each plot of about the usual thickness. In 1895 the Red Fife wheat was used in the usual quantity of $1\frac{1}{2}$ bushels per acre.

The season of 1895 at Ottawa has been favourable for the growing of spring wheat, and has given crops considerably above the average. This year the plot on which the rotted manure was used has yielded at the rate of 2 bushels 20 lbs. per acre more than that on which the fresh manure was used. This gain is a little more than sufficient to offset the previous gains of the fresh manure plot and the rotted manure plot now averages a little higher than any other plot in the series.

EXPERIMENTS with Fertilizers on Plots of Wheat $\frac{1}{10}$ th acre each.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR SEVEN YEARS.		8TH SEASON, 1895. VARIETY, RED FIFE.		AVERAGE YIELD FOR EIGHT YEARS.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year since.	17 24 $\frac{2}{7}$	3,316	27 40	4,520	18 41 $\frac{2}{3}$	3,466
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year since.....	17 33	3,265	25 20	4,800	18 31 $\frac{3}{8}$	3,457
3	Unmanured	10 7 $\frac{1}{2}$	1,851	8 50	1,870	9 57 $\frac{1}{8}$	1,853
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	10 19 $\frac{2}{7}$	1,743	8 20	2,110	10 4 $\frac{3}{8}$	1,789
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre.....	12 12 $\frac{2}{7}$	2,898	11 20	2,800	12 6 $\frac{2}{8}$	2,886
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using.	15 19 $\frac{2}{7}$	2,787	21	4,120	16 17 $\frac{1}{8}$	2,954
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.	11 19 $\frac{1}{7}$	2,494	19 20	4,370	12 19 $\frac{2}{8}$	2,728
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	9 56 $\frac{2}{7}$	1,627	12	2,320	10 11 $\frac{7}{8}$	1,714
9	Mineral superphosphate, No. 1, 500 lbs. per acre... . .	10 52 $\frac{1}{7}$	1,613	15 30	2,230	11 26 $\frac{7}{8}$	1,690
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.	12 24 $\frac{2}{7}$	2,944	12	3,040	12 21 $\frac{2}{8}$	2,956
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	12 38 $\frac{4}{7}$	2,353	11 10	3,530	12 27 $\frac{4}{8}$	2,500
12	Unmanured	9 52 $\frac{3}{7}$	1,547	6 30	1,770	9 27 $\frac{4}{8}$	1,575
13	Bone finely ground, 500 lbs. per acre.	10 17 $\frac{1}{2}$	1,673	11 40	2,260	10 27 $\frac{1}{8}$	1,746
14	Bone finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	12 37 $\frac{6}{7}$	1,924	18 40	3,320	13 23 $\frac{1}{8}$	2,098
15	Nitrate of soda, 200 lbs. per acre.....	13 9 $\frac{2}{7}$	2,272	13 40	2,810	13 13 $\frac{1}{8}$	2,339
16	Muriate of potash, 150 lbs. per acre.....	13 26 $\frac{1}{7}$	1,816	22 20	2,480	14 33 $\frac{2}{8}$	1,899
17	Sulphate of ammonia, 300 lbs. per acre....	11 14 $\frac{1}{2}$	2,409	9 40	2,980	11 2 $\frac{3}{8}$	2,480
18	Sulphate of iron, 60 lbs. per acre.....	11 53 $\frac{1}{7}$	1,946	12 40	1,820	11 59 $\frac{3}{8}$	1,930
19	Common salt (Sodium chloride) 300 lbs. per acre.....	11 1 $\frac{1}{7}$	1,585	16 00	2,200	11 38 $\frac{3}{8}$	1,662
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.	11 35 $\frac{5}{7}$	1,848	16 40	2,510	12 13 $\frac{6}{8}$	1,931
21	Unmanured in 1889, mineral superphosphate, No. 2, 500 lbs. per acre, each year since.....	11 41 $\frac{1}{7}$	1,726	18 00	2,420	12 28 $\frac{4}{8}$	1,813

It will be observed that the yield of wheat on plot 17 where sulphate of ammonia is used as the fertilizer is relatively small. This is probably due to the very heavy growth of straw which causes early and very bad lodging. Similar lodging (although it does not affect the grain quite so badly) usually takes place both in oats and barley in plot 17, with much the same result.

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889, 1890 and 1891, $1\frac{1}{2}$ bushels in 1892 and 1893, and 2 bushels in 1894 and 1895. Two-rowed barley has been used for seed throughout the whole period. The varieties used were as follows: 1889, 1890 and 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894 and 1895 Canadian Thorpe, a selected form of the Duck-bill. In 1895 the Canadian Thorpe was sown 2nd May, came up 9th May and was harvested 9th August, requiring from the date of sowing to maturity a period of 99 days.

In 1895 the yield of the barley plots, Nos. 1, 2 and 10, were considerably higher than the average of past seasons. No. 19 has given exactly the same yield as the average of the previous six years, but all the other plots have fallen below the average. The plot fertilized with rotted barn-yard manure has given a slightly better yield than the plot where the manure was used fresh; not enough, however, to offset the previous gains of the fresh manure plot, which still averages 1 bush. 23 lbs. higher than that of the rotted manure for the seven years these tests have been continued.

EXPERIMENTS with Fertilizers on Plots of Barley, $\frac{1}{10}$ th acre.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR SIX YEARS.		7TH SEASON, 1895, VARIETY CANADIAN THORPE.		AVERAGE YIELD FOR SEVEN YEARS.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre.....	29 20 $\frac{5}{8}$	2,770	39 8	3,740	30 39 $\frac{1}{4}$	2,909
2	Barn-yard manure, fresh, 15 tons per acre.	31 13	3,047	38 46	4,200	32 17 $\frac{1}{2}$	3,212
3	Unmanured.....	14 5 $\frac{3}{8}$	1,548	11 32	1,550	13 36 $\frac{1}{2}$	1,548
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	14 1 $\frac{5}{8}$	1,418	12 14	1,620	13 37 $\frac{1}{2}$	1,447
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre.....	19 22 $\frac{3}{8}$	2,245	16 2	2,310	18 47	2,254
6	Barn-yard manure, partly rotted, and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using.....	25 2 $\frac{5}{8}$	2,362	24 28	2,640	24 47 $\frac{1}{2}$	2,402
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.	22 2 $\frac{5}{8}$	2,421	14 8	2,710	20 44 $\frac{1}{2}$	2,462
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	16 46 $\frac{1}{2}$	1,647	16 22	2,010	16 42 $\frac{1}{2}$	1,699
9	Mineral superphosphate No. 1, 500 lbs. per acre.....	19 44 $\frac{1}{8}$	2,132	18 36	1,510	19 36 $\frac{1}{2}$	2,043
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.....	23 25 $\frac{1}{2}$	2,387	27 4	2,780	24 1 $\frac{1}{2}$	2,443
11	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	22 21 $\frac{3}{8}$	2,552	23 16	2,150	22 27 $\frac{1}{2}$	2,495
12	Unmanured	13 6 $\frac{5}{8}$	1,296	7 34	1,030	12 17 $\frac{1}{2}$	1,258
13	Bone, finely ground, 500 lbs. per acre.....	14 8	1,291	10	1,520	13 27 $\frac{1}{2}$	1,324
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	20 5 $\frac{5}{8}$	1,950	16 32	2,160	19 30 $\frac{1}{2}$	1,980
15	Nitrate of soda, 200 lbs. per acre.....	22 22 $\frac{3}{8}$	2,688	14 28	2,340	21 16 $\frac{1}{2}$	2,638
16	Muriate of potash, 150 lbs. per acre.....	21 25 $\frac{3}{8}$	2,037	20 20	2,070	21 17 $\frac{1}{2}$	2,042
17	Sulphate of ammonia, 300 lbs. per acre....	19 3 $\frac{3}{8}$	2,257	9 28	1,960	17 31 $\frac{1}{2}$	2,215
18	Sulphate of iron, 60 lbs. per acre.....	18 35 $\frac{1}{2}$	1,926	13 16	1,720	17 46 $\frac{1}{2}$	1,897
19	Common salt (Sodium chloride) 300 lbs. per acre.....	26 12	2,022	26 12	2,380	26 12	2,073
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre.....	21 29 $\frac{1}{2}$	1,837	12 44	1,870	20 17 $\frac{1}{2}$	1,842
21	Mineral superphosphate No. 2, 500 lbs. per acre.....	20 31 $\frac{1}{2}$	1,774	18 16	1,680	20 15 $\frac{1}{2}$	1,761

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was 2 bushels in 1889 and 1890 ; 1½ bushels in 1891 1892 and 1893, and 2 bushels in 1894 and 1895. The varieties used were as follows : In 1889, Early English ; 1890, 1891, 1892, 1893, Prize Cluster ; and in 1894 and 1895 Banner. In 1895 the Banner was sown 2nd May, came up the 9th May, and was harvested August 13, requiring from the date of sowing to maturity a period of 103 days. In every instance this year the yield of oats has been very much above the average of the previous six years.

EXPERIMENTS with Fertilizers on plots of Oats, 110th acre.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR SIX YEARS.		7TH SEASON, 1895. VARIETY— BANNER.		AVERAGE YIELD FOR SEVEN YEARS.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre	35 21½	2,776	51 6	3,060	37 29½	2,817
2	Barn-yard manure, fresh, 15 tons per acre.	39 15½	3,010	71 26	4,080	44 2½	3,163
3	Unmanured	26 11½	1,507	31 16	1,750	27 2½	1,542
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	26 27½	1,850	28 28	1,600	27 3½	1,814
5	Mineral phosphate, untreated, finely ground ; 500 lbs., nitrate of soda, 200 lbs. per acre.....	39 27½	2,724	64 14	3,410	43 10½	2,822
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre ; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using.....	34 19	2,591	47 22	2,380	36 14½	2,561
7	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,000 lbs. per acre.....	35 10½	3,256	56 16	3,400	38 11½	3,277
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre.	32 9½	2,426	39 14	2,240	33 10½	2,399
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	27 7½	1,986	48 8	2,300	30 7½	2,031
10	Mineral superphosphate, No. 1, 350 lbs. ; nitrate of soda, 200 lbs. per acre.....	36 14½	2,856	62 12	3,520	40 4½	2,951
11	Mineral superphosphate, No. 1, 350 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.....	30 18½	2,488	50	3,000	33 11	2,561
12	Unmanured	22 10½	1,677	26 16	1,660	22 30½	1,675
13	Bone, finely ground, 500 lbs. per acre.....	26 21	1,964	41 26	2,340	28 26½	2,018
14	Bone, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.	27 24½	1,887	46 16	3,180	30 13½	2,072
15	Nitrate of soda, 200 lbs. per acre.	37 11½	2,567	56 6	3,370	40 ½	2,682
16	Muriate of potash, 150 lbs. per acre.....	29 19	2,242	38 28	2,280	30 30	2,247
17	Sulphate of ammonia, 300 lbs. per acre....	34 9½	3,236	63 8	3,340	38 15½	3,251
18	Sulphate of iron, 60 lbs. per acre.....	29 19	2,152	33 18	2,270	30 4½	2,169
19	Common salt (Sodium chloride) 300 lbs. per acre	27 23½	2,055	36 26	1,910	28 33½	2,034
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.....	27 25½	2,217	37 22	2,000	29 5½	2,186
21	Mineral superphosphate, No. 2, 500 lbs. per acre.....	26 5½	1,912	31 16	1,970	26 31	1,920

CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo and to have the corn so far advanced when cut that the ears shall be in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the dent varieties was tested under No. 1. The Mammoth Southern Sweet was tried in 1888, 1889 and 1890. In 1891 the Red Cob Ensilage was used, and in 1892, 1893, 1894 and 1895 a free growing flint variety, the Rural Thoroughbred White Flint, was tested. On the other half of the plot (No. 2) the Canada Yellow Flint was used in 1888, 1889 and 1890, the Thoroughbred White Flint in 1891, Pearce's Prolific in 1892, 1893 and 1894, and the Mammoth Eight Rowed Flint in 1895. For the first four years the No. 1 series was planted in drills three feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches apart, and the No. 2 in hills 3 feet apart each way and 4 or 5 kernels in a hill. During the past four years both sorts have been grown in hills. The corn in both series of plots was planted in 1895 on 23rd May, and cut 11th and 12th September. The yield of fodder on these plots during the past season has been considerably below the average of past years.

EXPERIMENTS with Fertilizers, on plots of Indian Corn, $\frac{1}{10}$ th acre each, cut green for Ensilage.

No. of Plot.	Fertilizers applied each year.	AVERAGE YIELD FOR SEVEN YEARS.		8TH SEASON, 1895		AVERAGE YIELD FOR EIGHT YEARS.	
		Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.	Plot No. 1— Thoroughbred White Flint, weight of green fodder.	Plot No. 2— Mamm. 8 row- ed, weight of green fodder.	Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.
		$\frac{1}{2}$ Per acre.	$\frac{1}{2}$ Per acre	$\frac{1}{2}$ Per acre.	$\frac{1}{2}$ Per acre	$\frac{1}{2}$ Per acre.	$\frac{1}{2}$ Per acre
		Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs
1	Barn-yard manure, well rotted, 12 tons per acre.....	15 1,568	11 1,109	13 1,380	13 780	15 1,044	11 1,568
2	Barn-yard manure, fresh, 12 tons per acre.	18 1,446	10 1,939	13 1,680	13 1,560	18 225	11 642
3	Unmanured	10 1	6 1,328	4 400	3 1,680	9 551	6 622
4	Mineral phosphate untreated, finely ground, 500 lbs. per acre in 1888—800 lbs. per acre each year since	8 691	5 1,123	4 100	3 660	7 1,617	5 565
5	Mineral phosphate untreated, finely ground, 500 lbs. per acre in 1888—800 lbs. per acre each year since; nitrate of soda, 200 lbs. per acre.....	12 550	8 1,079	9 1,840	7 1,300	11 1,961	8 857
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre; composted together, intimately mixed and allowed to heat for several days before using.....	17 743	11 1,566	13 200	11 900	16 1,675	11 1,483
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.....	15 1,983	10 1,164	13 80	10 1,440	15 1,245	10 1,198
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	12 1,381	8 1,570	8 1,400	6 1,900	12 383	8 1,111
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	11 1,609	8 940	8 1,060	6 1,440	11 790	8 502
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.....	14 1,460	10 1,307	10 1,900	10 100	14 515	10 1,156
11	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	16 1,510	12 903	13 1,420	12	16 749	12 790

EXPERIMENTS with Fertilizers, on plots of Indian Corn, $\frac{1}{10}$ th acre each, &c.—Continued.

No. of Plot.	Fertilizers applied each year.	AVERAGE YIELD FOR SEVEN YEARS.		8TH SEASON, 1895.		AVERAGE YIELD FOR EIGHT YEARS.	
		Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.	Plot No. 1— Thoroughbred White Flint, weight of green fodder.	Plot No. 2— Mamm. grow- ed, weight of green fodder.	Plot No. 1— weight of green fodder.	Plot No. 2— weight of green fodder.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs
12	Unmanured	12 144	9 1,509	8 1,660	7 1,180	11 1,333	9 968
13	Bone, finely ground, 500 lbs. per acre.....	12 473	9 460	10 700	7 100	12 1	8 1,915
14	Bone, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre	12 1,887	8 1,914	8	8 300	12 651	8 1,712
15	Nitrate of soda, 200 lbs. per acre	14 644	10 1,357	10 300	8 360	13 1,601	10 732
16	Sulphate of ammonia, 300 lbs. per acre....	14 1,115	10 1,164	11 1,000	7 600	14 351	10 343
17	Mineral superphosphate No. 1, 600 lbs. ; muriate of potash, 200 lbs. ; sulphate of ammonia, 150 lbs. per acre	13 1,164	9 656	9 1,580	9 100	13 216	9 586
18	Muriate of potash, 300 lbs. per acre	9 1,781	6 231	7 900	4 1,800	9 1,171	5 1,927
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90 ; (muri- ate of potash, 200 lbs., substituted each year since;) dried blood, 300 lbs. ; mineral superphosphate No. 1, 500 lbs. per acre.	11 1,359	7 856	10 1,180	10 600	11 1,087	7 1,574
20	Wood ashes, unleached, 1,900 lbs. per acre.	10 1,686	6 1,961	7 1,000	6	10 850	6 1,716
21	Bone, finely ground, 500 lbs. ; sulphate of ammonia, 200 lbs. ; muriate of potash, 200 lbs. per acre	13 247	8 1,388	15 150	9 1,050	13 735	8 1,596

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under so that the plant food they have taken from the soil may be returned to it. One-half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips. The preparation of the land has been the same for both these roots. It has been ploughed in the autumn after the crop is gathered, disc-harrowed or gang-ploughed once in the spring, harrowed with smoothing harrow once, then ridged and sown.

In 1889, the variety of mangel used was the Mammoth Long Red. In 1890, three varieties were sown : 15 rows of Mammoth Long Red, 6 of Mammoth Long Yellow, and 6 of Golden Intermediate on each plot. In 1891, each plot again had three varieties : 18 rows of Mammoth Long Red, 3 of Yellow Fleshed Tankard, and 6 of Golden Tankard. In 1892, 1893, 1894 and 1895, one variety only has been used, namely, the Mammoth Long Red. From 4 to 6 lbs. of seed have been sown per acre, each year, in rows $2\frac{1}{2}$ feet apart. In 1895 the mangels were sown May 10, came up May 26th, and were pulled October 10th.

Two varieties of turnips were sown on the half plots devoted to these roots in 1889 : 25 rows of Carter's Prize Winner, and 2 rows of Carter's Queen of Swedes ; and in 1890, a single variety : Carter's Elephant Swede. In 1891, six varieties were sown : 6 rows of Lord Derby Swede, 4 of New Giant King, 3 of Imperial Swede, 6 of Champion Swede, 4 of Purple Top Swede, and 4 of East Lothian Swede. In 1892, the Improved Purple Top Swede only was sown, in 1893 and 1894 the Prize Purple Top Swede, and in 1895 the Imperial Swede. The land used for the turnips, which are usually sown later than the mangels, is allowed to stand after disc-harrowing or gang-ploughing, then cultivated once and ridged immediately before sowing. In 1895, the turnips were sown June 2, came up June 18, and were pulled October 9. The plots of both mangels and turnips have yielded, during the past season, a little better than the average of previous years.

EXPERIMENTS with Fertilizers on Roots ; Plots of Mangels and Turnips $\frac{1}{10}$ th acre each.

No. of Plot.	Fertilizers applied each Year.	AVERAGE YIELD FOR SIX YEARS.		7TH SEASON, 1895. VARIETIES.		AVERAGE YIELD FOR SEVEN YEARS.	
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	East Half Plot.	West Half Plot.	Mangels, Weight of Roots.	Turnips, Weight of Roots.
		Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.
1	Barn-yard manure, well rotted, 20 tons per acre.....	21 1,257	11 1,090	22 1,560	15 420	21 1,586	12 137
2	Barn-yard manure, fresh, 20 tons p. ac.	20 1,492	12 1,573	24 1,830	14 1,630	21 683	13 153
3	Unmanured.....	9 1,955	7 92	6 900	2 1,680	9 947	6 890
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre.....	9 285	7 945	7 300	2 620	8 1,716	6 1,470
5	Mineral phosphate, untreated, finely ground, 1,000 lbs.; nitrate of soda, 250 lbs.; wood ashes, unleached, 1,000 lbs. per acre.....	13 985	8 2	13 1,720	2 1,220	13 1,090	7 462
6	Barn-yard manure, partly rotted and actively fermenting, 12 tons per acre; mineral phosphate, untreated, finely ground, 1,000 lbs., composted together, intimately mixed and allowed to heat for several days before using.....	17 1,480	11 1,405	18 1,010	7 1,700	17 1,699	11 304
7	Mineral phosphate, untreated, finely ground, 1,000 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890, (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years;) nitrate of soda, 200 lbs. per acre....	10 381	8 1,671	10 1,260	2 790	10 507	7 1,831
8	Mineral superphosphate, No. 1, 500 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890, (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years;) nitrate of soda, 200 lbs. per acre.....	15 33	11 685	12 1,650	9 1,900	14 1,407	11 287
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	10 118	8 462	7 170	7 1,760	9 1,268	8 362
10	Nitrate of soda, 300 lbs. per acre....	14 831	8 750	12 1,970	3 240	14 422	7 1,250
11	Sulphate of ammonia, 300 lbs. per ac.	10 1,477	9 868	12 1,140	5 510	11	8 1,674
12	Unmanured.....	7 1,752	7 365	4 1,630	3 390	7 877	6 1,226
13	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,000 lbs. per acre	10 1,022	7 797	9 580	5 740	10 673	7 217
14	Wood ashes, unleached, 2,000 lbs. p. ac	11 1,893	7 1,272	11 1,170	5 120	11 1,790	7 536
15	Common salt (Sodium chloride) 400 lbs. per acre.....	11 8	7 1,808	7 1,470	2 180	10 1,074	7 147
16	Mineral superphosphate, No. 1, 500 lbs.; nitrate of soda, 200 lbs. per ac.	14 1,061	10 475	10 390	9 420	13 1,822	10 181
17	Mineral superphosphate, No. 1, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	12 1,948	9 286	10 1,880	7 100	12 1,367	8 1,688
18	Mineral superphosphate, No. 1, 500 lbs.; muriate of potash, 200 lbs. p. ac.	12 1,898	10 391	10 1,620	6 1,580	12 1,287	9 1,418
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890; (muriate of potash, 200 lbs., substituted each year since;) dried blood, 250 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre.....	14 478	9 1,821	15 1,860	12 280	14 961	10 458
20	Wood ashes, unleached, 1,500 lbs.; common salt (Sodium chloride) 300 lbs. per acre.....	14 1,969	9 1,922	14 1,730	8 300	14 1,935	9 1,405
21	Mineral superphosphate, No. 2, 500 lbs. per acre.....	16 169	10 71	13 1,870	7 1,360	15 1,555	9 1,398

CARROT PLOTS.

Carrots have been sown on alternate halves of the oat plots for the past five years, for the purpose of cleaning the land from weeds. This work was begun in 1891, and the plots have been sown each year with the variety known as the Improved Short White. In 1895, carrots occupied the east half of the plots. The seed was sown May 10, came up May 27. The plants came up so very thin that the land was ploughed again on June 12th and resown. The young carrots came up June 24th and made rapid growth and the roots were pulled October 21. The crop, this year, sown so late was considerably below the average of the three preceding years.

EXPERIMENTS with Fertilizers on half plots (one-twentieth acre) of Carrots (Improved Short White), after Oats.

No. of Plot.	Fertilizers applied each Year.	Average Yield for four years.	5th Season Improved Short White.	Average Yield for five years.
		Weight of roots per acre.	Weight of roots per acre.	Weight of roots per acre.
		Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre.	20 1,520 $\frac{1}{4}$	9 570	18 930
2	Barn-yard manure, fresh, 15 tons per acre.	23 675 $\frac{1}{4}$	9 1,360	20 1,212
3	Unmanured	16 590	5 720	14 216
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	16 102 $\frac{1}{2}$	4 1,350	13 1,552
5	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. per acre.	19 269 $\frac{3}{4}$	6 10	16 1,018
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre ; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using.	21 925 $\frac{1}{4}$	11 80	19 756
7	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,000 lbs., per acre.	16 1,492 $\frac{3}{4}$	10 100	15 814
8	Mineral phosphate, untreated, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.	13 1,095	8 320	12 940
9	Mineral superphosphate, No. 1 500 lbs. per acre.	11 850 $\frac{1}{4}$	5 930	10 466
10	Mineral superphosphate, No. 1 350 lbs. ; nitrate of soda, 200 lbs. per acre	14 432 $\frac{1}{4}$	5 1,020	12 950
11	Mineral superphosphate, No. 1 350 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.	18 1,852 $\frac{3}{4}$	6 910	16 864
12	Unmanured.	15 1,470 $\frac{1}{4}$	1 140	12 1,604
13	Bone, finely ground, 500 lbs. per acre.	15 1,855	3 860	13 856
14	Bone, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.	20 495	10 1,720	18 740
15	Nitrate of soda, 200 lbs. per acre.	18 1,783 $\frac{1}{4}$	7 40	16 1,035
16	Muriate of potash, 150 lbs. per acre.	19 914 $\frac{3}{4}$	8 1,460	17 624
17	Sulphate of ammonia, 300 lbs. per acre.	14 922 $\frac{1}{4}$	3 1,250	12 588
18	Sulphate of iron, 60 lbs. per acre.	15 958	4 210	13 408
19	Common salt (Sodium chloride), 300 lbs. per acre.	17 842 $\frac{1}{2}$	5 1,050	15 84
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.	17 1,730	3 510	14 1,886
21	Mineral superphosphate, No. 2 500 lbs. per acre.	14 1,557 $\frac{1}{2}$	4	12 1,246

POTATO PLOTS.

The alternate halves of the wheat and barley plots which were occupied by carrots and sugar beets in 1891, 1892 and 1893, as explained in the annual report for 1893, were planted with potatoes in 1894 and 1895. These were planted in rows, $2\frac{1}{2}$ feet apart, with the sets about one foot apart in the rows.

Those after wheat were planted May 21st, came up June 8th and were dug October 2nd. On each of these plots there were seven rows of Early Rose, five Queen of the Valley, five Daisy, five Early Sunrise and five rows of May Queen Early.

Those after barley were planted May 23rd, came up June 8th and were dug September 30th. On each of these plots, there were seven rows of Wonder of the World, seven Thorburn, seven Beauty of Hebron and six rows of Lee's Favourite. In the table the yield of each variety for each plot is given, also the total yield in bushels per acre.

The average yield of the different varieties per row, putting the 21 plots all together, is as follows—the conditions, as far as they can be determined, being about equal :—

Queen of the Valley.....	461 $\frac{4}{5}$
Early Rose.....	426 $\frac{5}{7}$
Early Sunrise.....	407 $\frac{1}{5}$
Daisy.....	376
Wonder of the World.....	344 $\frac{2}{7}$
Thorburn.....	329 $\frac{1}{7}$
Lee's Favourite.....	284
May Queen Early.....	268 $\frac{3}{5}$
Beauty of Hebron.....	256 $\frac{4}{7}$

By comparing these figures with the results obtained on the same plots last year it will be seen that the Beauty of Hebron, which was then at the head of the list with a yield of $406\frac{1}{3}$ lbs. per row, is this year at the foot, with a return of $256\frac{4}{7}$ lbs. The Early Rose, which in 1894 stood at the bottom of the list, with a yield of $235\frac{1}{2}$ lbs. per row, is this year second, with $426\frac{5}{7}$ lbs. No explanations are offered for these wide differences in results under apparently similar circumstances. They do, however, serve to show the importance of avoiding hasty conclusions and the necessity of continuing such experiments for a series of years, when more reliable inferences may be drawn from the average results obtained.

EXPERIMENTS with Fertilizers on half plots ($\frac{1}{20}$ acre) of Potatoes after Wheat.

No. of Plot.	Fertilizers Applied Each Year.	EAST HALF OF PLOTS.					Total Yield per Acre.	
		Yield of 7 rows Early Rose.	Yield of 5 rows Queen of the Valley.	Yield of 5 rows Daisy.	Yield of 5 rows Early Sunrise.	Yield of 5 rows May Queen, Early.		
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year since.	Lbs. 206	Lbs. 193	Lbs. 179½	Lbs. 189½	Lbs. 151	Bush. 306	Lbs. 20
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year since	287	213½	221	213½	163	366	
3	Unmanured.	120	93	82	85	54	144	40
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	125	105	54½	60	39	127	50
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre.	142	95	80	96	60	157	40
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using.	258	179	185	183	147	317	20
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.	178	130	132	125	74	213	
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.	180	99	90	80	74	174	20
9	Mineral superphosphate, No. 1, 500 lbs. per acre.	149	103	81	86½	88	169	10
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	162	80	92½	101½	72½	169	30
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.	227	153½	156	160	127	274	30
12	Unmanured.	81	94	55	85½	44	119	50
13	Bone, finely ground, 500 lbs. per acre.	116	85	29	50½	28	102	50
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.	174	139	96	128	76	204	20
15	Nitrate of soda, 200 lbs. per acre.	52	71	43½	93	40	99	50
16	Muriate of potash, 150 lbs. per acre	99	103	106	101	35	148	
17	Sulphate of ammonia, 300 lbs. per acre	89	78	47½	57½	15½	95	50
18	Sulphate of iron, 60 lbs. per acre	91	99	53	58	9	103	20
19	Common salt (Sodium chloride), 300 lbs. per acre.	94½	76	37	10½	1	73	
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre.	75	56	19½	24	7½	60	40
21	Unmanured in 1889, mineral superphosphate, No. 2, 500 lbs. per acre each year since.	82	64	39	48	38	90	20

The very low yields obtained on parts of plots 16, 17, 18, 19, were due to a hollow place in the land where the water resulting from a heavy rain flooded it soon after the plants appeared above ground. This was followed by a very hot sun, which destroyed most of the young growth before the drains could carry off the accumulated water.

EXPERIMENTS with Fertilizers on Half-Plots ($\frac{1}{20}$ acre) of Potatoes after Barley.

No. of Plot.	Fertilizers applied each Year.	WEST HALF OF PLOTS.					
		Yield of 7 rows Wonder of the World.	Yield of 7 rows Thor- burn.	Yield of 7 rows Beauty of Hebron.	Yield of 6 rows Lee's Favour- ite.	Total Yield per Acre.	
		Lbs.	Lbs.	Lbs.	Lbs.	Bush.	lbs.
1	Barn-yard manure, well rotted, 15 tons per acre....	223	225	174	103	241	40
2	Barn-yard manure, fresh, 15 tons per acre.....	212	225	181	131 $\frac{1}{2}$	249	50
3	Unmanured	80	87	79	58 $\frac{1}{2}$	101	30
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	96	91	50	44	93	40
5	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. per acre.....	113	73	55 $\frac{1}{2}$	54	98	30
6	Barn-yard manure, partly rotted and actively fer- menting, 6 tons per acre ; mineral phosphate, untreated, finely ground, 500 lbs. per acre, com- posted together, intimately mixed and allowed to heat for several days before using.....	207	226	155 $\frac{1}{2}$	143	243	50
7	Mineral phosphate, untreated, finely ground, 500 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,000 lbs. per acre.....	144	128 $\frac{1}{2}$	94	87 $\frac{1}{2}$	151	20
8	Mineral phosphate, untreated, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre.	166	117	80	89	150	40
9	Mineral superphosphate, No. 1, 500 lbs. per acre....	137 $\frac{1}{2}$	103	101	115	152	10
10	Mineral superphosphate No. 1, 350 lbs. ; nitrate of soda, 200 lbs. per acre	92	113	83	83	123	40
11	Mineral superphosphate No. 1, 350 lbs. ; nitrate of soda, 200 lbs. ; wood ashes, unleached, 1,500 lbs. per acre	112	150 $\frac{1}{2}$	110	116 $\frac{1}{2}$	163	
12	Unmanured	79	64	28	43	71	20
13	Bone, finely ground, 500 lbs. per acre.....	85	54	56	52 $\frac{1}{2}$	82	30
14	Bone, finely ground, 500 lbs. ; wood ashes, unleached, 1,500 lbs. per acre	144	148	138	114	181	20
15	Nitrate of soda, 200 lbs. per acre	67	61	57	59	81	20
16	Muriate of potash, 150 lbs. per acre	112	103	88	96	133	
17	Sulphate of ammonia, 300 lbs. per acre.....	80	82	50	70	94	
18	Sulphate of iron, 60 lbs. per acre	77	74	58	82 $\frac{1}{2}$	97	10
19	Common salt (Sodium chloride) 300 lbs. per acre....	44	55	35	43	59	
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.....	42	36 $\frac{1}{2}$	36	34 $\frac{1}{2}$	49	40
21	Mineral superphosphate No. 2, 500 lbs. per acre....	98	88	87	84 $\frac{1}{2}$	119	10

LOSS IN WEIGHT OF BARN-YARD MANURE DURING THE PROCESS OF ROTTING.

Since much difference of opinion exists among farmers as to the actual loss which takes place in the weight of manure during the process of rotting, the following test was made at the Central Experimental Farm at Ottawa, during the past season for the purpose of gaining further information on this subject.

On the 7th of March, 1895, two tons (4,000 lbs.) of horse manure and two tons (4,000 lbs.) of cow manure were taken fresh from the barn-yard and placed in a shed on boards laid close together on the ground. It was thus preserved from leaching by exposure to rain. This manure has been turned and weighed once a month and the pile carefully watched to see that proper conditions of moisture were preserved. The following is the result of the several weighings :—

	Weight of Manure in lbs.
March 7, when test was begun.....	8,000
April 6, reduced in weight to.....	5,530
May 7, “ “ “	4,278
June 7, “ “ “	3,947
July 6, “ “ “	3,480
August 7, “ “ “	3,142
Sept. 7, “ “ “	3,053
October 7, “ “ “	2,812
Nov. 7, “ “ “	2,685
Dec. 7, “ “ “	2,600

On the 6th of July, that is at the end of four months when the 8,000 lbs. of fresh manure originally placed in the shed was reduced to 3,480 lbs., the manure was then in what would be considered first-class condition, having that pasty character which would admit of its being cut easily with a spade and mix readily with the soil. Subsequently it became more friable and when weighed on September 7th, it was found to break up easily, almost like soil. By December 7th, it had frozen quite solid and had to be broken up with a pick. It is proposed to continue these monthly weighings to the end of the year and to repeat the experiment again with similar quantities next season. The results of the test of nine months has been to reduce the weight of the manure under experiment from 8,000 lbs. to 2,600 lbs. showing a loss of more than two-thirds of the original weight.

From the results obtained from tests which have been made during the past eight years as to the action of fertilizers on crops, the particulars of which are given in the foregoing pages, it would appear that the action of fresh manure is almost equally beneficial ton per ton to that of rotted manure in the growing of nearly all the staple crops. The question of the best and most economical methods of handling barn-yard manure is one of the greatest importance to farmers everywhere, since animal manures form one of their most valuable assets. As a result of many analyses, it is estimated that twenty tons of good barn-yard manure contain about 196 lbs. of nitrogen, 128 lbs. of phosphoric acid and 172 lbs. of potash, which if estimated by their cost as obtainable from the cheapest artificial sources represents a sum of not less than \$45. When we consider that there are in the Dominion over four millions of horned cattle, and nearly 1½ millions of horses, besides sheep and swine, it is of the highest importance that the manure given by this vast number of animals should be economically handled so that the best possible use may be made of the fertilizers it contains.

DISTRIBUTION OF SEED GRAIN.

The efforts which have been made during the past seven years to improve the quality and character of the different varieties of grain and other staple agricultural products grown in Canada by distributing samples of the most promising sorts to farmers for test, have been continued with gratifying results. The demand for these

samples has been unusually large, more than 31,000 applications having been received, while the total quantity of material available was only sufficient to supply 26,036. These samples were forwarded to 25,932 applicants, one sample only being sent to each, except in a few special cases where the applicants lived in very remote districts, from which the applications were few. In these exceptional cases two samples were sent.

Preparations are being made for the distribution for 1896, which will consist of some of the most promising sorts of oats, barley, wheat, pease, corn and potatoes. The several branch farms will also distribute as heretofore samples to farmers residing in the provinces and territories where these institutions have been established.

The samples sent out from the Central Experimental Farm at Ottawa during the early months of 1895, were distributed as follows:—

Prince Edward Island.

Oats.....	240
Wheat.....	145
Barley.....	126
Pease.....	48
Potatoes.....	109
Corn.....	117
	<hr/>
	785
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Number of applicants supplied, 778.

Nova Scotia.

Oats.....	680
Barley.....	538
Wheat.....	311
Pease.....	235
Potatoes.....	250
Corn.....	155
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	2,169
	<hr/>

Number of applicants supplied, 2,120.

New Brunswick.

Oats.....	581
Wheat.....	221
Barley.....	180
Pease.....	156
Potatoes.....	317
Corn.....	232
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	1,687
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Number of applicants supplied, 1,682.

Ontario.

Oats.....	2,160
Wheat.....	516
Barley.....	571
Pease.....	579
Potatoes.....	1,313
Corn.....	675
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	5,814
	<hr/>

Number of applicants supplied, 5,794.

Quebec.

Oats.....	6,068
Wheat.....	1,859
Barley.....	3,060
Pease.....	943
Potatoes.....	1,817
Corn.....	462
	<hr/>
	14,209
	<hr/>

Number of applicants supplied, 14,189.

Manitoba.

Oats.....	159
Wheat.....	86
Barley.....	67
Pease.....	64
Potatoes.....	100
Corn.....	21
	<hr/>
	497
	<hr/>

Number of applicants supplied, 497.

North-west Territories.

Oats.....	243
Wheat.....	90
Barley.....	114
Pease.....	74
Potatoes.....	146
Corn.....	25
	<hr/>
	692
	<hr/>

Number of applicants supplied, 689.

British Columbia.

Oats.....	55
Wheat.....	23
Barley.....	13
Pease.....	24
Potatoes.....	48
Corn.....	20
	<hr/>
	183
	<hr/>

Number of applicants supplied, 183.

The following list shows the number of three-pound packages of the different varieties which have been distributed :—

Oats.

Banner.....	3,432
Prize Cluster.....	2,274
Wallis.....	1,578
Early Gothland.....	511
Poland White.....	716
Bonanza.....	459
Rosedale.....	394
Abundance.....	351
Winter Grey.....	195
Welcome.....	208
English White.....	68
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	10,186
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Barley, Two-Rowed.

Canadian Thorpe.....	1,849
Kinver Chevalier.....	317
Prize Prolific.....	338
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	2,504
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Barley, Six-Rowed.

Odessa.....	2,165
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Wheat.

Red Fife.....	2,622
White Fife.....	133
Johnson.....	135
White Connell.....	126
Ladoga.....	119
Red Fern.....	116
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	3,251
	<hr/>

Pease.

Mummy.....	1,665
Large White Marrowfat.....	201
New Potter.....	101
Prussian Blue.....	156
	<hr/>
	2,123
	<hr/>

Potatoes.

Lee's Favourite.....	1,261
Thorburn.....	927
Beauty of Hebron.....	901
Wonder of the World.....	766
White Beauty.....	55
Vanier.....	23

Potatoes—Concluded.

Russell's Seedling.....	22
Queen of the Valley.....	17
Polaris.....	18
Lizzie's Pride.....	16
Crown Jewel.....	14
Monroe County.....	15
State of Maine.....	17
Pride of the Market.....	12
Early Gem.....	12
Burpee's Extra Early.....	9
Early Norther.....	5
Earliest of all.....	4
I. X. L.....	4
Daisy.....	2
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	4,100
	<hr/>

Corn.

Rural Thoroughbred White Flint.....	847
Mammoth Yellow Flint.....	833
Longfellow.....	27
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	1,707
	<hr/>

Total number of samples distributed.....	26,036
Number of applicants supplied.....	25,932

A few samples of fall wheat were also sent out for test, as follows:—

Ontario.....	44
Manitoba.....	1
North-west Territories.....	6
British Columbia.....	5
	<hr/>
	56
	<hr/>

Number of applicants supplied 54.

DISTRIBUTION OF CROSS-BRED AND HYBRID CEREALS.

A new feature in the distribution made during the past season from the Central Farm was the sending out for test, samples of some of the more promising of the hybrid and cross-bred cereals which have been produced on the experimental farms. These were put up in bags containing one pound each and were sent to some of those farmers in different sections of the Dominion who have shown a special interest in this part of the experimental work. In most instances two samples were sent to each farmer. One of wheat and one of barley. They have been distributed as follows:—

Prince Edward Island.

Cross-bred wheats.....	43
Hybrid barleys.....	43
	<hr/>
	86

New Brunswick.

Cross-bred wheats.....	107
Hybrid barleys.....	107
	<hr/>
	214
	<hr/>

Nova Scotia.

Cross-bred wheats.....	66
Hybrid barleys.....	66
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	132
	<hr/>

Quebec.

Cross-bred wheats.....	191
Hybrid barleys.....	202
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	393
	<hr/>

Ontario.

Cross-bred wheats.....	356
Hybrid barleys.....	356
	<hr/>
	712
	<hr/>

Manitoba.

Cross-bred wheats.....	97
Hybrid barleys.....	93
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	190
	<hr/>

North-west Territories.

Cross-bred wheats.....	55
Hybrid barleys.....	55
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	110
	<hr/>

British Columbia.

Cross-bred wheats.....	31
Hybrid barleys.....	31
	<hr/>
	62
	<hr/>

This makes a total of 1,899 samples which have been sent to 955 farmers.

The total number of samples distributed from the Central Experimental Farm for test during 1895 was 27,991 ; number of applicants supplied, 26,941.

Samples were also distributed from the branch experimental farms as follows :—

Experimental Farm, Nappan, N.S.

Oats.....	302
Barley.....	121
Wheat.....	76
Rye.....	9
Pease.....	52
Potatoes.....	198
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	758
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Number of applicants supplied, 341.

Experimental Farm, Brandon, Man.

Grain of all kinds in 3 lb bags.....	149
Potatoes.....	48
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	197
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Experimental Farm, Indian Head, N.W.T.

Oats.....	244
Barley.....	165
Wheat.....	186
Rye.....	38
Pease.....	164
Potatoes.....	340
	<hr/>
	1,137
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Experimental Farm Agassiz, B.C.

Oats.....	62
Barley.....	58
Fall wheat.....	31
Spring wheat.....	54
Pease.....	138
Potatoes.....	127
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	470
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This makes a total of 2,562 samples supplied to about 1,341 applicants by the branch experimental farms, which, added to the distribution made at the Central Farm, gives a total of 30,553 samples to about 28,282 applicants.

As indicating the success of this work and the appreciation in which it is held by farmers throughout the Dominion the following extracts are submitted from reports and letters recently received :—

W. Bryden, Cardigan Bridge, P.E.I., received a sample of 3 lbs. of Banner oats from which he harvested 177 lbs. of grain. He says :—“This is the best yield I ever saw or heard of. Can any one in the Dominion beat it ?”

E. Larkins, jr., of Darnley, P.E.I., had 173 lbs. of grain from 3 lbs. of Banner oats, and says :—“In my opinion this grain suits the country well.”

T. C. Newman, of Lower Derby, N.B., writes:—"I received last year from you 3 lbs. of White Fife seed wheat which I sowed and raised 35 lbs, 34lbs of which I sowed this spring on a little over $\frac{1}{4}$ acre of ordinary wheat land, and threshed this fall 812 lbs. of good clean wheat which is something over 50 bushels per acre. I think that pretty good in this part of the Dominion. I also received 3 lbs. of Ligowo oats at the same time I got the wheat; it yielded last year 54 lbs. which I sowed this spring on $\frac{1}{3}$ of an acre of ordinary oat land, and threshed this fall 967 lbs. clean oats, upwards of 85 bushels per acre. I think the Dominion government is doing a good thing for the farmers in giving them improved seed which was much needed in this section of the country."

T. H. Estey, of Wicklow, N.B., reports a yield of 60 lbs. from 3 lbs. of Mummy pease, and says:—"The government deserve much credit for taking so good a way to distribute good seed grain all over the Dominion."

Alex. Johnson, of Lower Woodstock, N.B., received a 3-lb. sample of Mammoth Yellow Flint corn, and speaking of the crop, says:—"The weight per square rod was 359 lbs. This variety of corn is the best we have ever tried for fodder."

W. Ewing, of Apohaqui, N.B., raised 190 lbs. of Banner oats from 3 lbs. of seed, and says: "I am well pleased with the oats, it is the first sample of grain I have received from the Experimental Farm, but I hope it will not be the last."

J. T. Hobbah, of Walton, N.S., received a 3-lb. sample of Wonder of the World potatoes. He says "they are so satisfactory that I shall plant the whole of their produce next spring."

D. A. McIver, of Milan, Que., reports a yield of 140 lbs. from 3 lbs. of Red Fife wheat, and says: "I am very well pleased with it."

Thomas White, of River Joseph, Que., harvested 108 lbs. of Prize Cluster oats from 3 lbs. of seed, and says of this variety: "it compares favourably with other grain and ripens earlier."

Thos. Moses, of Brachen, Ont., had a yield of 92 lbs. from 3 lbs. of Abundance oats, and says: "We consider them a very fine quality of oats, a good yielder, and a splendid sample."

Thos. Dawson, jr., of Barrie, Ont., had 3 bushels 28 lbs. from 3 lbs. of Early Gothland oats. He says: "These oats compare favourably with other sorts, give more straw and more grain. I think the idea of sending out samples of grain a good one, as it will afford farmers the opportunity of getting good sorts of seeds without paying fancy prices."

P. M. Stewart, of Boulter, Ont., reports a yield of 200 lbs. of Early Gothland oats from 3 lbs. of seed and says: "I am well satisfied with the oats, they ripen earlier and give a heavier crop than other sorts."

C. F. Horn, of Orillia, Ont., received for trial 3 lbs. of Mammoth Yellow Flint corn. He says: "I have grown corn for the last 25 years, and I think the Mammoth Yellow Flint the best all round field corn I ever raised. I intend giving one acre a fair trial next year."

W. F. Sutherland, of Holiday, Ont., raised 178 lbs. from 3 lbs. of Wallis oats, and says: "We are well pleased with the yield."

James Reed, of Carman, Man., had a yield of 90 lbs. from 3 lbs. of Odessa barley, and says "it ripens as early as other six-rowed barley of this province, and the straw is stiffer and the grain plumper and heavier."

John Miller, of Bridge Creek, Man., had 157 lbs. from 3 lbs. of Banner oats, weighing $42\frac{1}{4}$ lbs. per bushel, and says: "I consider the Banner oats the best I have tried."

R. Hargest, of Qu'Appelle, N.W.T., reports a yield of 1 bushel 3 pecks from a 3-lb. sample of New Potter pease. He says: "This is a splendid pea for this part, it has long pods, well filled, and I think could hardly be beat for this climate."

P. J. Power, of Bathurst village, N.B., when acknowledging a sample of grain, says: "Farmers have reason to be thankful for those samples, some of us are now able to sow our full crop with good seed obtained in this way a few years ago." Such quotations might be indefinitely extended.

CROSS-BRED AND HYBRID CEREALS.

Many gratifying reports of the results of the tests of these new varieties have been received of which the following will serve as examples.

D. H. Ross of Douglas, N.B., received a sample of 1 lb. of Surprise barley, a six-rowed sort produced at the central farm by crossing a two-rowed barley with a six-rowed, from which he raised 35 lbs. He says, "This is the finest barley I ever saw grow; it grew heavier and ripened earlier than any other sort. I had it to a show, and it took first prize away ahead of all other barley," the sample returned weighed $52\frac{3}{4}$ lbs. per bushel.

W. Cronkite, of Lower Southampton, N. B., reports a crop of 30 lbs. from 1 lb. of Huron wheat (a cross between Ladoga and White Fife), and says, "I consider the Huron the best variety of wheat I ever grew." The sample returned weighed $62\frac{3}{4}$ lbs. per bushel.

Henry King, of Victoria, B.C., received a 1-lb. sample of Advance wheat, another cross between Ladoga and White Fife, from which he raised 46 lbs. He says, "I got the second prize at the Victoria Exhibition with it, it looked the prettiest grain there. I hope to do better with it next season; many thanks for sending it to me." The sample returned weighed 64 lbs. per bushel.

W. Brown, of Somenos, B.C., reports a yield of 109 lbs. from 1 lb. of seed of Advance wheat. He says, "It is the best variety I have ever tested."

TESTS OF THE VITALITY OF GRAIN AND OTHER SEEDS.

The number of samples of seed grain, and other seeds tested during the season of 1895, was 1,776. The average vitality of the important cereals was lower than in 1894, but higher than in 1893. The following figures show the variations in the averages for the years named:

	1893.	1894.	1895.
Wheat.....	81·8	90·5	88
Barley.....	84·9	89	85·7
Oats.....	93	95·5	93·3

The fact that there were samples of wheat and oats sent for test during the past season which showed only 22 per cent of germinating power and samples of barley 24 per cent points to the necessity of having all doubtful samples tested. Suitable arrangements have been made for carrying on these tests at the Central Experimental Farm, Ottawa, where every farmer in the Dominion may send samples for examination and report. No charge is made for this work and samples of seed may be sent to the Central Farm free through the mail. The tests of vitality can usually be completed and reported on within a fortnight after they are received. All samples should be sent in early in the season so as to admit of this work being completed before spring opens.

The building in which these tests are conducted and from which the distribution of samples of seed grain is made is shown in Fig. 2

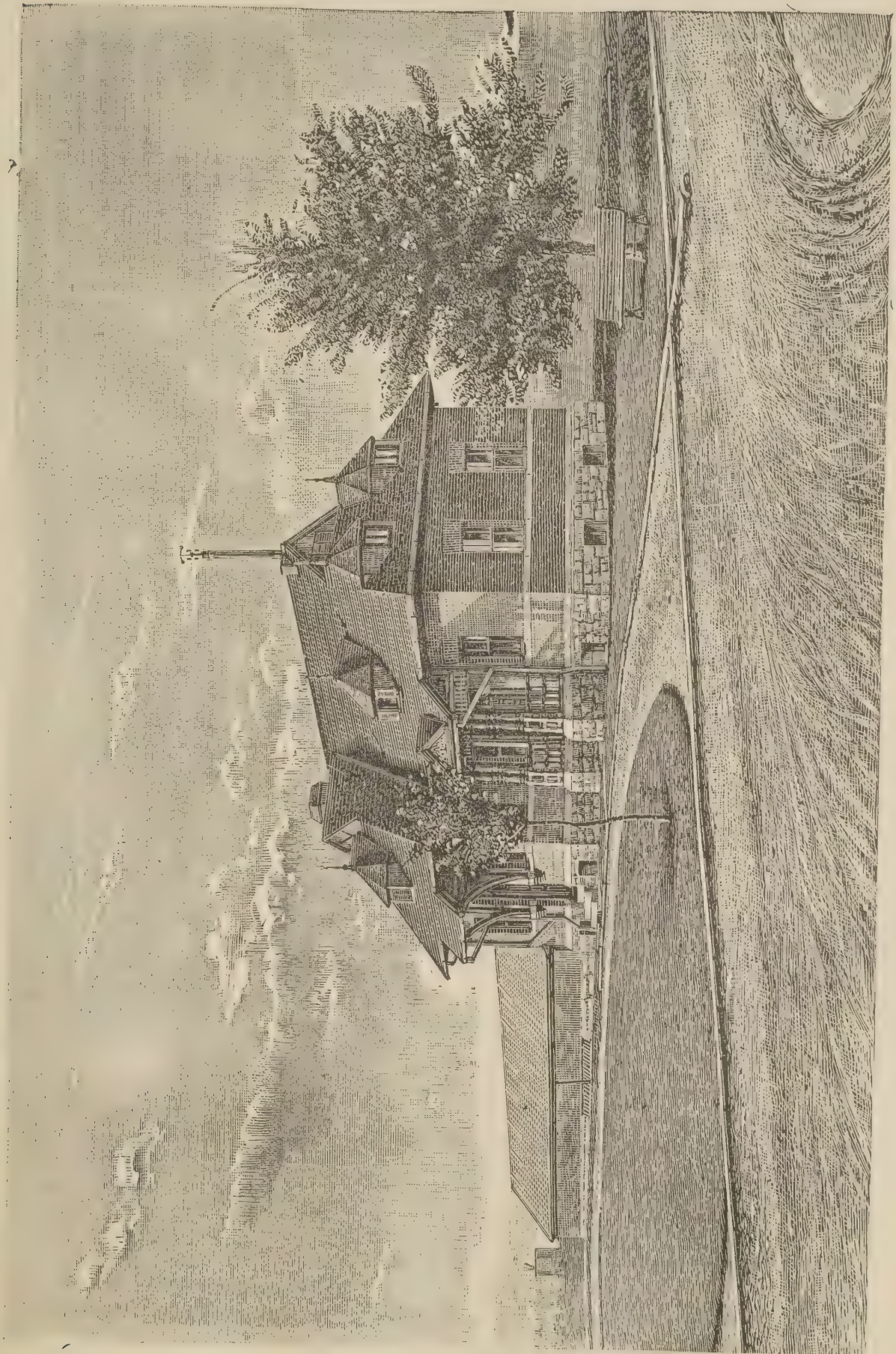


FIG. 2.—BUILDING FOR TESTING THE VITALITY OF SEEDS AND FOR THE DISTRIBUTION OF SEED GRAIN.

RESULT of Tests of Seeds for Vitality, 1894-95.

Kind of seeds.	Number of tests.	Highest percentage.	Lowest percentage.	Percentage of strong growth.	Percentage of weak growth.	Average vitality.
Wheat....	459	100·0	22·0	82·1	5·9	88·0
Barley.....	397	100·0	24·0	70·8	14·9	85·7
Oats.....	587	100·0	22·0	87·1	6·2	93·3
Rye.....	2	70·0	16·0			43·0
Pease.....	56	100·0	6·0			63·3
Corn.....	45	100·0	0·0			74·3
Clover.....	5	83·0	42·0			64·4
Grass.....	64	94·0	0·0			45·5
Beans.....	4	80·0	30·0			61·0
Mangels.....	18	96·0	10·0			55·4
Turnips.....	11	100·0	7·0			72·0
Carrots.....	23	82·0	2·0			49·9
Sugar Beet.....	8	94·0	22·0			49·2
Sunflowers.....	16	96·0	62·0			78·2
Tares.....	2	92·0	84·0			88·0
Flax.....	1	88·0	88·0			88·0
Tomatoes.....	9	70·0	20·0			46·5
Radish.....	6	100·0	78·0			93·0
Asparagus.....	2	56·0	50·0			53·0
Cabbage.....	3	95·0	64·0			81·3
Cauliflower.....	2	52·0	49·0			50·5
Onions.....	8	88·0	22·0			57·1
Lettuce.....	5	100·0	0·0			41·0
Melons.....	3	36·0	4·0			17·3
Squash.....	2	67·0	36·0			51·5
Cucumbers.....	4	76·0	26·0			58·0
Salsify.....	1	53·0	53·0			53·0
Parsnips.....	1	1·0	1·0			1·0
Summer Savory.....	1	39·0	39·0			39·0
Flowers.....	32	100·0	0·0			34·5
Pepper.....	1	0·0	0·0			0·0
Total number of samples tested, highest and lowest percentage.....	1,776	100·0	0·0			

The following table shows the results of the tests of the more important cereals made for each province. From the figures given it will be seen that the samples from Manitoba give the highest percentage of vitality, closely followed by the North-west Territories.

TABLE showing Results of Grain Tests for each Province.

Kind of Seed.	Number of tests.	Highest percentage.	Lowest percentage.	Percentage of strong growth.	Percentage of weak growth.	Average vitality.
Ontario—						
Wheat.....	174	100·0	41·0	75·0	7·3	82·3
Barley.....	116	100·0	24·0	55·4	22·1	77·5
Oats.....	178	100·0	22·0	88·7	5·8	94·5
Quebec—						
Wheat.....	135	100·0	22·0	83·2	6·4	89·6
Barley.....	164	100·0	24·0	68·9	16·6	85·5
Oats.....	191	100·0	42·0	86·4	5·8	92·2
Manitoba—						
Wheat.....	56	100·0	75·0	90·1	4·3	94·4
Barley.....	41	100·0	89·0	94·3	3·2	97·5
Oats.....	56	100·0	72·0	93·1	4·2	97·3

TABLE showing Results of Grain Tests for each Province—*Concluded.*

Kind of Seed.	Number of tests.	Highest percentage.	Lowest percentage.	Percentage of strong growth.	Percentage of weak growth.	Average vitality.
North-west Territories—						
Wheat.....	45	100·0	85·0	90·6	3·1	93·7
Barley.....	36	100·0	86·0	91·2	3·6	94·8
Oats.....	75	100·0	76·0	83·2	9·6	92·8
Nova Scotia—						
Wheat.....	17	100·0	58·0	88·1	4·3	92·4
Barley.....	17	98·0	73·0	81·8	6·2	88·0
Oats.....	31	100·0	53·0	86·2	7·0	93·2
New Brunswick—						
Wheat.....	21	100·0	68·0	83·6	2·8	91·4
Barley.....	16	100·0	78·0	78·4	12·1	90·5
Oats.....	42	100·0	28·0	87·4	5·3	92·7
Prince Edward Island—						
Wheat.....	6	99·0	80·0	84·5	5·3	89·8
Barley.....	4	95·0	88·0	82·7	8·0	90·7
Oats.....	9	100·0	25·0	73·1	8·2	81·3
British Columbia—						
Wheat.....	3	95·0	84·0	83·3	4·3	87·6
Barley.....	3	92·0	88·0	83·3	7·0	90·3
Oats.....	5	100·0	87·0	88·6	5·2	93·8

METEOROLOGICAL OBSERVATIONS.

Table of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1895; maximum, minimum and mean temperature for each month, with date of occurrence; also rainfall and snowfall:—

—	Maxi- mum.	Date.	Mini- mum.	Date.	Mean.	Rain- fall.	Snow- fall.
	°		°			in.	in.
January.....	37·9	11	—19·4	5	12·8	0·18	38·50
February...	38·0	27	—23·0	6	13·5	.....	19·50
March.....	41·9	25	—11·5	12	20·3	0·09	13·00
April.....	71·0	29	15·3	11	42·6	2·58	.....
May.....	93·5	30	27·5	22	59·1	2·86	.....
June.....	91·8	2	48·0	7	69·6	6·33	.....
July.....	91·2	8	46·0	11	66·0	3·24	.....
August.....	86·8	17	45·5	23	65·1	4·66	.....
September...	90·3	22	34·0	16	60·1	1·64	.....
October.....	64·0	6 & 13	16·5	30	40·5	0·38	2·00
November.....	60·0	5	1·5	30	32·2	2·01	7·00
December.....	52·8	26	—17·5	13	20·7	3·04	7·50
						27·01	87·50

Rain or snow fell on 142 days during 12 months.

Heaviest rainfall in 24 hours, 2·27 inches on June 27.

Heaviest snowfall in 24 hours, 12 inches on February 12.

During April, May and July, rain fell on 11 days each month and on 13 days in August.

February and March show the lowest number of days on which rain fell during the season, viz., 2 days and 1 day respectively.

B. NOTHNAGEL.

RESULTS OF EXPERIMENTS WITH ROSES.

The rose has been justly designated the "Queen of flowers" and its beauty of form and colouring and delicious fragrance make it attractive to all. It has been immortalized by authors and poets in all countries from the most ancient times, and this charming flower has long been the national emblem of England. The majestic and perfectly formed varieties cultivated in modern times are a great advance on the single or semi-double forms grown in earlier ages, and these triumphs are the special products of man's genius and perseverance. To no group of flowers has the art of hybridizing and cross fertilizing been more extensively and persistently applied than to the rose and gardeners everywhere have also been on the watch to take advantage by selection and careful cultivation of such accidental sports as occur from time to time under the ordinary processes of nature.

Having been grown with great care for many centuries and crossed and recrossed so often it is sometimes a difficult matter to refer the cultivated forms of the rose to their wild originals. Roses are usually divided into two groups, viz., summer roses and perpetual or autumnal roses, and these are subdivided into a number of different classes.

The first division of the summer roses includes the Ayrshire and prairie roses, the second the Austrian or Yellow roses, the third the Moss roses, and the fourth miscellaneous roses among which the well known cabbage or Provence rose is a worthy member. None of these summer roses bloom more than once in the season and their period of flowering in the climate of Ottawa usually covers the latter half of June and the early days of July.

The second division comprising the perpetual or autumnal roses includes among many others the Teas, Hybrid Teas and Hybrid Remontants or Perpetuals. Many of the finest roses in cultivation are not sufficiently hardy to endure the winter climate of Ottawa and the losses which lovers of the rose have experienced from having selected tender varieties for cultivation have had the result of discouraging many, and roses although rapidly growing in favour are not so generally cultivated with us as they should be. There are however among the hardier classes, many excellent roses which with some protection in winter can be successfully grown in the open ground in most parts of Canada.

To gain information on this point many varieties of roses have been under test at the Central Experimental Farm at Ottawa, during the past two or three years. The climate here is fairly representative of the colder sections of Eastern Ontario and of most of the settled portions of the province of Quebec, and any varieties which succeed in this district can probably be grown with greater advantage in more favorable climates in Western Ontario, the Maritime Provinces and British Columbia.

Among the summer roses, all the varieties of moss roses have been found quite hardy, also the Prairie roses and the Persian yellow. Among the miscellaneous varieties in this class Madame Plantier deserves a place in the front rank for hardiness, vigour of growth and abundance of bloom. The flowers are white, double and very fragrant. As already stated none of these roses bloom in the autumn, but they flower profusely during their period of blooming which usually lasts from two to three weeks.

Of the roses belonging to the second class the Teas or ever-blooming sorts are all too tender for outdoor culture in Ottawa unless they are taken up in the autumn, packed in sand and stored in a cool cellar during the winter. Several of the Hybrid Teas have proven fairly hardy, notably La France and Captain Christy, but of all roses for outdoor culture the Hybrid Perpetuals are by far the most useful and satisfactory, many of them with a little protection are quite hardy, and reward the cultivator with a wealth of bloom which is highly gratifying. The principal part of the crop of flowers is borne from the middle of June to the middle of July, but many of the most esteemed varieties continue to bloom at intervals until late in the autumn.

PLANTING AND TREATMENT.

The rose needs a rich soil, a good garden loam enriched with well rotted manure dug to a depth of twelve inches or more will suit it well. A more or less sheltered but

sunny location is also advantageous, but roses will not thrive in the immediate vicinity of large trees whose foliage interferes with the free access of sunlight and whose spreading roots monopolise the available plant food in the soil. In selecting roses for planting it is a great advantage to have them on *their own roots*, notwithstanding that some of the varieties thus propagated are poor growers, otherwise one is continually troubled with strong growing suckers from the wild stocks, which if not early noticed and promptly removed will often weaken and eventually smother out the graft. In planting spread the roots carefully so as to give them their natural positions, set the plant a little deeper than as grown in the nursery, and press the soil firmly about the roots.

INJURIOUS INSECTS.

To prevent injury from insects spray or syringe the bushes just as they are coming into leaf with Paris green and water in the proportion of a teaspoonful of the poison to three gallons of water stirring frequently while using, and repeat this application whenever leaf-eating insects appear. If thrip is troublesome, spray the foliage while the insects are still young with kerosene emulsion or a strong decoction of tobacco stems, 4 to 8 ounces, boiled for 10 minutes in a gallon of water to which $\frac{1}{4}$ lb. of soap may be added. The latter is also a useful application for the green aphid.

WINTER PROTECTION.

For winter protection the plan which has been most successful at the Experimental Farm—where the bushes are planted three feet apart each way with six feet of space between every third row—is to dig between the rows and throw the earth about the rose bushes, covering them up to a depth of 8 to 10 inches. Fill the trenches made by the removal of the earth with fresh manure and loosely cover the earth around the plants with two or three inches of the same material. The stems are usually cut back to about one foot in height before covering. In the spring remove the earth from about the roses, and bury up in the soil as much of the manure as is practicable, and as soon as the buds start, remove any dead wood with a sharp knife or pruning shears. Under such treatment the rose beds at Ottawa have been very successful and have given much pleasure to the visiting public throughout the season.

LIST OF DESIRABLE ROSES.

The following list contains only a small proportion of the roses which are being tested at Ottawa, it does however contain a large proportion of those sorts which are the most promising and desirable. Only those are included which have been tested for two or three winters and found hardy. Among the varieties more recently received there are quite a number of very fine roses which may prove quite as hardy as any of the following. In the meantime, however, the list given offers sufficient material for a very fine selection.



No. 3. Baroness Rothschild.

1. *Baron Haussman*.—This is a strong grower and a free bloomer. The flowers are of medium size, fine form and fairly double; colour, deep carmine crimson. A desirable rose which blooms well through the autumn.

2. *Baron Prevost*.—A very vigorous grower and free bloomer. The flowers are of medium size, good form, of a deep rose colour and very fragrant. A free autumn bloomer.

3. *Baroness Rothschild*.—Fig. 3 shows this rose on a reduced scale. A fair grower and free bloomer. The flowers are large, elegantly formed of a rich pale rose colour and faintly fragrant. A free bloomer during autumn.

4. *Blanche Moreau*.—A vigorous grower but not a very free bloomer. The flowers are of medium size, well formed, fairly compact, white and very fragrant. A very good autumn bloomer.

5. *Caroline de Sansal*.—A free grower and a free bloomer. The flowers are large of good form, pale silvery rose in colour and very fragrant. This variety blooms fairly well throughout the autumn.

6. *Comte de Montmart*.—A strong grower and very free bloomer. The flowers are large, of good form, of a deep rose colour and fragrant. A free bloomer during autumn.

7. *Comtesse de Serenye*.—A good grower and free bloomer, but later than some others in flowering. The flowers are large, full and of elegant form, colour deep rose, paler on the edges of the petals, slightly fragrant. This is an excellent late bloomer flowering freely to nearly the end of the season.

Crimson Queen.—A fair grower and free bloomer. The flowers are of medium size, good form, of a reddish velvety crimson colour and very fragrant. A fair autumn bloomer, but does not flower so freely as some other sorts.

9. *Duchesse de Morny*.—A fair grower and a free bloomer. The flowers are large of fair form, deep bright rose in colour and slightly fragrant. A good autumn bloomer.

10. *Earl of Dufferin*.—This is a strong grower and a good bloomer. The flowers are of medium size, fine form, full and compact of a deep rich reddish crimson and are fragrant. Blooms freely throughout the autumn.

11. *Etienne Levet*.—A strong grower and very free bloomer. The flower is of medium size, compact and full, of a carmine red colour and fragrant. This variety blooms well during the autumn.

12. *Eugene Furst*.—This is a very strong grower and fair bloomer. The flowers are of medium size and elegant form, of a brilliant dark crimson colour and very fragrant, one of the best; flowers fairly well during autumn.

13. *François Levet*.—A vigorous grower and very free bloomer. The flower is of medium size, very double and compact, of a deep cherry red colour and fragrant. Blooms fairly well in the autumn.

14. *Gabriel Fournier*.—A fair grower and a free bloomer. The flower is of medium size, fair form, of a deep red rose colour, and fragrant. A free bloomer during the autumn.

15. *Horace Vernet*. — This is a vigorous grower and free bloomer bearing its flowers in clusters. The flowers are large, of good form, not very double of a reddish crimson colour and slightly fragrant. A fair autumn bloomer.

16. *Hyppolyte Jamain*. —A strong grower and a free bloomer. The flowers are of medium size, good form, of a deep carmine red colour and slightly fragrant. Blooms fairly well during the autumn.

17. *John Hopper*.—This is an old and well known variety, a fair grower and a free bloomer. The flowers are from medium to large, very full and compact, of a deep reddish rose colour and fairly fragrant. A good autumn bloomer. In Fig. 4



Fig. 4. John Hopper.

we have a good representation, full size, of this fine rose. We are indebted to the kindness of the Dingee & Conard Co., the well known rose growers of West Grove, Pa., for the use of this cut.

18. *Lady Helen Stewart*.—A strong grower and a free bloomer. The flowers are large, of good form fairly compact, of a deep crimson scarlet colour with a faint purplish hue, and fragrant. Blooms sparingly during the autumn.



Fig. 5. *Madame Gabriel Luizet*.

19. *Louis Van Houtte*.—A fair grower and a free bloomer. The flowers are of medium size, fine form, of a deep crimson colour and very fragrant. Flowers freely during autumn.

20. *Madame Eugene Verdier*.—A medium grower and a free bloomer. The flowers are large of a very fine globular form, creamy rose colour and tea-like fragrance. A free bloomer in the autumn.

21. *Madame Gabriel Luizet*.—Fig. 5 represents this rose on a reduced scale. A very strong grower and an abundant bloomer. The flowers are very large, cup-shaped, compact, very handsome, of a creamy rose colour, and slightly fragrant. One of the finest roses in the collection and a fair bloomer during the autumn.

22. *Madame Joly*.—A strong grower and an abundant bloomer. The flowers are from medium to large, of good form, compact, of a pale rose, deepening in colour towards the centre, fragrant. A very satisfactory rose, which blooms well during the autumn.

23. *Madame Victor Verdier*.—A very strong grower and a very free bloomer. The flower is large, full and of fine form, the colour is a bright carmine crimson at first, becoming somewhat paler after exposure; fragrant. This is a free bloomer during the autumn.

24. *Mad'le Eugene Verdier*.—A medium grower and a free bloomer. The flowers are large, of very fine form, a creamy rose in colour, with a tea-like fragrance. A good bloomer during the autumn.

25. *Marchioness of Lorne*.—A vigorous grower and a good bloomer. The flowers are of medium size, fairly compact, of a crimson rose colour and very fragrant. A fairly good autumn bloomer.

26. *Margaret Dickson*.—This handsome rose is a very strong grower, with large foliage and a medium bloomer. The flower is large, of elegant form, white with a flesh-coloured centre and fragrant. A very desirable and promising rose, only a medium bloomer during autumn.

27. *Marie Kady*.—A strong grower and a free bloomer. The flower is of medium size, full and compact, colour at first bright reddish crimson which becomes paler after exposure, fragrant. This is rather a shy bloomer in the autumn.

28. *Marshall P. Wilder*.—A strong grower and a free bloomer. The flowers are large, semi-globular in form, full, compact, of a cherry crimson colour and very fragrant. This variety is one of the hardiest and best in the collection. A medium bloomer during autumn.

29. *Merveille de Lyon*.—A fair grower and a free bloomer. The flowers are large double, but not very compact, of a waxy white colour, with a faint tinge of pink and slightly fragrant. A very fine rose, only a medium bloomer during autumn.

30. *Mons. Francois Michelin*.—A strong grower and a very free bloomer. The flower is of medium size, good form, a deep but bright rose colour and slightly fragrant. blooms freely during the autumn.

31. *Princess Beatrice*.—A strong grower and a very free bloomer. The flowers are large, of fine form, fairly compact, the petals deep rosy pink, with a bluish margin, not fragrant. A good bloomer during the autumn.

32. *Queen of Queens*.—A fair grower and a free bloomer. The flowers are large, of fine form of a creamy rose colour and faintly fragrant. This is a very free bloomer during the autumn.

33. *Rev. J. B. M. Camm*.—A medium grower and a free bloomer. The flowers are of medium size, form semi-globular, colour carmine rose, and very fragrant. A fair autumn bloomer.

34. *Silver Queen*.—A vigorous grower and a very free bloomer. The flowers are of medium size, good form, of a silvery rose colour and fragrant. A free bloomer during the autumn.

35. *Victor Verdier*.—A medium grower and a very free bloomer. The flowers are large and full, of a bright rose colour with carmine centre, slightly fragrant. A free bloomer during the autumn. This rose is said to be tender but it has proven hardy here with the same protection as that given to other varieties.

36. *White Baroness*.—A strong grower but not a free bloomer. The flowers are large, of beautiful form, white, but without fragrance. This is a white sport from the Baroness Rothschild, and like the parent is a good autumn bloomer.

REPORT OF THE FOREMAN OF FORESTRY.

A winter of average severity and abundant snowfall was followed, in the spring, by warm, bright weather; the frost soon left the soil, and outside work was begun in the division of forestry and ornamental grounds, at a very early date.

On examination, it was found that the trees and shrubs in the forest belts, arbor-etum, avenues, ornamental grounds and hedges had, for the most part, wintered well, and were in good condition to begin the season's growth. The grass of the lawns, also, was found to be quite uninjured.

TIMBER TREES—FOREST BELTS.

In the report of the director for the year 1893 will be found the various objects in view in planting the trees in the forest belts at the Central Experimental Farms. These belts of trees have now become a prominent feature of the farm at Ottawa, and, as information regarding the growth of timber trees has of late become a subject of much inquiry, it is thought best at this time to publish some details regarding the growth of some of the average trees in these respective plantations.

The soil in the location where these trees are planted is, most of it, of poor quality and has had no manure. It will be seen by consulting the following table and notes that, notwithstanding these disadvantages, they have done very well indeed, which is no doubt due in some measure to the cultivation which the soil regularly received until the trees were sufficiently grown to shade the ground, and thus retain moisture and smother weeds. It would appear also from the vigorous growth the trees have made that good soil is not always essential to rapid tree growth.

A few of the species planted have not succeeded well ; some because they were not sufficiently hardy to endure the climate, and others owing to unsuitability of soil. In this report notes and measurements are given of the most important timber trees which have done well here. Several average trees were measured in each plantation, and the average growth calculated from these measurements.

MIXED FOREST BELTS.

The forest trees in the mixed belt, where a number of varieties are grown together which were planted in the spring of 1893, have made good growth, and now cover the ground in many places. For this reason cultivation was only necessary in the spring of 1895, before growth had begun. The trees in that portion of the mixed belt planted in the autumn of 1894 have also done well. During the autumn of the present year, the trees were examined individually, and it was found that of the 3,442 planted, 347 had died. Nearly half of these were *Thuya occidentalis*, *Larix americana*, and *Betula papyrifera*, which had been transplanted from a neighbouring swamp to this forest belt, and these trees thus taken from the woods had only a small proportion of roots.

MIXED FOREST BELT.

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height When Planted.	Average Height, Autumn of 1895.	Average Growth in				Circumference 1 Foot from Ground.	
						1892.	1893.	1894.	1895.	1893.	1895.
			feet.		ft. in.	in.	in.	in.	in.	in.	in.
Black Walnut— <i>Juglans nigra</i>	Low sandy loam.....	1888..	5 x 5	1 year....	9 11½	26	23	21	18	5½	7½
do	do	1888..	10 x 10	1 do ..	5 5	12	17½	11	9	3	5
do	Sandy loam with small stones.	1889..	5 x 5	2 do ..	12 8	37½	28	36	19	.....	8½
do	do	1889..	10 x 10	2 do ..	8 4½	15	25	28	15	.....	7½
do	Clay loam.....	1888..	10 x 5	1 do ..	12 5	31	31	31	15½	.....	10½
Butternut— <i>Juglans cinerea</i>	Low sandy loam	1888..	5 x 5	1 do ..	9 11	19	24	18	10½	.....	6½
do	do	1888..	10 x 10	1 do ..	6 2½	18	15	15	16	.....	4½
European Alder— <i>Alnus glutinosa</i>	do	1889..	5 x 5	2 do ..	16 5	38	33	21	27	7½	10½
Silver-leaved Maple— <i>Acer dasycarpum</i>	Light sandy oam.....	1889..	5 x 5	3 do ..	23 2	37	40	33	29	.....	9½
do	do	1889..	10 x 10	3 do ..	22 6	53	38	33	20½	.....	13
European White Birch— <i>Betula alba</i>	do	1889..	5 x 5	3 do ..	23 1	58	18	17	14	.....	10½
do	do	1889..	10 x 10	3 do ..	24 11	36	32	30	30	.....	13
Canoe Birch— <i>Betula papyrifera</i>	do	1889..	5 x 5	3 do ..	21 9	46	36	22	14	.....	9½
do	do	1889..	10 x 10	3 do ..	21 2	34	24	33	28	.....	13
Yellow Birch— <i>Betula lutea</i>	Light sandy loam.....	1889..	5 x 5	3 do ..	16 6	47	30	35½	21	.....	8½
do	do	1889..	10 x 10	3 do ..	16 1	41	33	26	21	6½	11½
White Elm— <i>Ulmus americana</i>	Sandy loam.....	1889..	5 x 5	3 do ..	14 5	33	38	27½	23	5½	6½
do	do	1889..	10 x 10	3 do ..	13 9	44	31	25	18	6	9
Black Ash— <i>Fraxinus sambucifolia</i>	Black muck.....	1889..	5 x 5	2 do ..	12 4	38	26	32	8	5	6½
do	Low sandy loam.....	1889..	10 x 10	2 do ..	8	20	23	19	8	3½	5
Green Ash— <i>Fraxinus viridis</i>	Black muck.....	1889..	5 x 5	3 do ..	15	30	31	29	20	6½	7½
do	Low sandy loam.....	1889..	10 x 10	3 do ..	14 3	28	24	21½	21	7½	8½
Red Ash— <i>Fraxinus pubescens</i>	Black muck.....	1889..	5 x 5	2 do ..	15 5	31	34	39	33	5	7
do	Light sandy loam.....	1889..	10 x 10	2 do ..	12 5	26	32	27½	21	4½	6½
White Ash— <i>Fraxinus americana</i>	Black muck.....	1889..	5 x 5	3 do ..	18 5	32	41	58	36	5½	7
do	Light sandy loam.....	1889..	10 x 10	3 do ..	15 9	38	38	37	25	5½	8½
Black Cherry— <i>Prunus serotina</i>	Light sandy loam and gravel.	1889..	5 x 5	3 do ..	16 7	29	21	22	19	.....	8½
do	do	1889..	10 x 10	3 do ..	18 2	40	39	32	26	.....	11½
Box Elder— <i>Negundo aceroides</i>	Light sandy loam.....	1889..	5 x 5	2 do ..	19 1	38	38	39	29	8½	10½
Buttonwood— <i>Platanus occidentalis</i>	do	1889..	5 x 5	3 do ..	14 5	24	27	17	21	.....	7½
Populus certinensis.....	do	1889..	5 x 5	2 do ..	26 7	57	72	54	52	.....	11½
Bolle's Poplar— <i>Populus alba Bolleana</i>	do	1890..	5 x 5	1 do ..	24 2	46	68	63	70	.....	11½
do	do	1890..	10 x 10	1 do ..	22 11	40	55	70	74	.....	12½
Scotch Pine— <i>Pinus sylvestris</i> ..	Sandy loam with gravel	1888..	5 x 5	18 inches..	14 4	29	28	35½	31	7½	10
do	do	1888..	10 x 10	18 do ..	11	15	22	28½	29	9½	12
do	Low sandy loam with gravel.	1888..	5 x 5	18 do ..	13 4	26	29	32½	29	7½	9½

[illegible]

NOTES ON TIMBER TREES IN FOREST BELTS.

BLACK WALNUT (*Juglans nigra*).

Trees 5 x 5 feet apart—all Black Walnut.

Owing to the unsuitability of the soil and lack of prompt drainage these did not make very good growth at first, but they are now doing well. Another block on higher land is doing better. No cultivation was needed in either of these blocks after 1893.

Trees 10 x 10 feet apart—all Black Walnut. Very few of the trees first planted now remain, as most of them either died or became stunted from excess of moisture before the land was properly drained. The trees used to replace those originally planted are not yet making as satisfactory growth as those on higher ground.

Trees 10 x 5 feet apart—Mixed Forest Belt. The black walnut trees in this belt are doing very well and are making rapid growth.

BUTTERNUT (*Juglans cinerea*).

Trees 5 x 5 feet apart—all Butternut. These trees have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Butternut. Some of the trees of the first planting died owing to excessive moisture before the soil was properly drained, hence there is a lack of uniformity in the growth of the trees in this block, and cultivation is still necessary.

EUROPEAN ALDER (*Alnus glutinosa*).

Trees 5 x 5 feet apart—all European Alder. These have made rapid and fairly uniform growth. No cultivation was necessary after 1892.

Trees 10 x 10 feet apart—all European Alder. The trees planted as above have not done as well as where planted 5 feet apart. Quite a number have lost their leaders and others, from some unknown cause, have died during the past two years.

SILVER-LEAVED MAPLE (*Acer dasycarpum*).

Trees 5 x 5 feet apart—all Maple. These have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Maple. The trees in this block have also made rapid and fairly uniform growth. No cultivation was needed after 1892.

EUROPEAN WHITE BIRCH (*Betula alba*).

Trees 5 x 5 feet apart—all White Birch. These have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all White Birch. In this block the trees have also made rapid and fairly uniform growth. No cultivation was needed after 1894.

PAPERY OR CANOE BIRCH (*Betula papyrifera*).

Trees 5 x 5 feet apart—all Canoe Birch. These have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Canoe Birch. The trees in this block have also made rapid and fairly uniform growth. No cultivation was needed after 1893.

YELLOW BIRCH (*Betula lutea*).

Trees 5 x 5 feet apart—all Yellow Birch. These have made rapid and fairly uniform growth, and have not needed any cultivation since 1892.

Trees 10 x 10 feet apart—all Yellow Birch. The trees in this block have also made rapid and fairly uniform growth, and have not needed any cultivation since 1894.

AMERICAN ELM (*Ulmus americana*.)

Trees 5 x 5 feet apart—all American Elm. These have made rapid and fairly uniform growth. No cultivation was needed after 1893.

Trees 10 x 10 feet apart—all American Elm. The elms in this block have also made rapid and fairly uniform growth. No cultivation will be necessary after this season.

BLACK ASH (*Fraxinus sambucifolia*).

Trees 5 x 5 feet apart—all Black Ash. These have made medium and fairly uniform growth, and have not needed cultivation since 1893.

Trees 10 x 10 feet apart—all Black Ash. The soil where these trees were planted, though adjacent, is not so suitable for the ash as that in the block of trees 5 feet apart. These trees have made scarcely medium growth, and are not so uniform in size as the others. Close planting also seems to be more favourable to vigorous growth.

GREEN ASH (*Fraxinus viridis*).

Trees 5 x 5 feet apart—all Green Ash. These trees have made rapid and fairly uniform growth, and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all Green Ash. The soil differs from that where the trees are 5 feet apart, and does not seem so suitable. The trees not having made so rapid or uniform growth as others. No cultivation will be necessary after this season.

RED ASH (*Fraxinus pubescens*).

Trees 5 x 5 feet apart—all Red Ash. These have made rapid and fairly uniform growth, and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all Red Ash. The trees in this block have not made so rapid or uniform growth as where planted 5 feet apart. The soil is different and does not seem so suitable. Close planting also seems to be more favourable to vigorous growth.

WHITE ASH (*Fraxinus americana*).

Trees 5 x 5 feet apart—all White Ash. The white ash in this block have made the most rapid growth of all the species of ash. The trees are fairly uniform in height and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all White Ash. These trees have not made so rapid or uniform growth as when planted 5 feet apart. The soil is different and does not seem so suitable. Wider planting seems also to be disadvantageous.

BLACK CHERRY (*Prunus serotina*).

Trees 5 x 5 feet apart—all Black Cherry. The trees in this block have made rapid and fairly uniform growth and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all Black Cherry. These trees have also made rapid and fairly uniform growth and have not needed cultivation since 1892.

BOX ELDER (*Negundo aceroides*).

Trees 5 x 5 feet apart—all Box Elder. The trees in this block have made rapid and fairly uniform growth. No cultivation was required after 1892. A number of the trees in this block have died from some unknown cause during the past two seasons.

Trees 10 x 10 feet apart—all Box Elder. The trees in this block made rapid and fairly uniform growth until 1894. Since that time a large proportion of them have died back, owing to what appears to be a sort of dry rot, and have broken off about 3 feet, from the ground. No cultivation was required after 1892.

BUTTONWOOD (*Platanus occidentalis*).

Trees 5 x 5 feet apart—all Buttonwood. No cultivation was needed in this block of trees after 1892. The trees have made rapid and fairly uniform growth.

Trees 10 x 10 feet apart—all Buttonwood. Most of the trees planted as above have had their leaders injured and are making shrubby rather than tree-like growth. For this reason no measurements were taken.

Populus certinensis.

Trees 5 x 5 feet apart—all Poplar.

The trees in this block have made very rapid and fairly uniform growth. The trees of the outside rows being much larger in circumference than those further in. They would average $17\frac{1}{2}$ inches in circumference one foot from the ground. Some of the trees have died apparently from a dry rot of some kind. No cultivation was needed after 1892. None of these poplars were planted 10 x 10 feet apart.

BOLLE'S POPLAR (*Populus alba Bolleana*).

Trees 5 x 5 feet apart—all Bolle's Poplar. These have made very rapid and fairly uniform growth, and have not needed cultivation since 1893.

Trees 10 x 10 feet apart—all Bolle's Poplar. The trees planted as above have also made very rapid and fairly uniform growth. Owing to their upright habit of growth cultivation is still necessary.

SCOTCH PINE (*Pinus sylvestris*).

Trees 5 x 5 feet apart—all Scotch Pine. These trees have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Scotch Pine. These have also made rapid and fairly uniform growth, but are shorter, though larger in circumference than those planted 5 feet apart. They are now interlacing in places.

Trees 10 x 5 feet apart—Mixed Forest Belt. The Scotch pine in the mixed belt have also done well. They seem to do best on the lighter soils.

Trees 3 x 3 feet apart—all Scotch Pine. These trees were planted in nursery rows in 1887, the rows being 3 feet apart, and the trees about 6 to 8 inches apart in the rows. In 1893 they were thinned out until they were about 3 feet apart each way. They have made rapid and fairly uniform growth, but their circumference is not so great as when planted further apart.

EUROPEAN LARCH (*Larix europæa*).

Trees 5 x 5 feet apart—all European Larch. A very fine block of trees which have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all European Larch. These trees have not made so strong or uniform growth as those planted 5 feet apart; more tops have been broken and the trees are not so straight.

Trees 10 x 5 feet apart—Mixed Forest Belt. The European larch in the mixed belt, though few in number, have done very well. The land where these trees are planted is high and dry. These larches have done well on both clay and sandy loam.

WHITE SPRUCE (*Picea alba*).

Trees 5 x 5 feet apart—all White Spruce. The soil in this block is a light sandy loam but the trees have made medium growth and are fairly uniform in height. No cultivation was needed after 1894.

Trees 10 x 10 feet apart—all White Spruce. On similar soil these have also made medium growth but are not so uniform in height as those in rows 5 feet apart. Cultivation is still necessary.



FIG. 6 --VIEW OF SOME OF THE SAMPLE HEDGES, ON THE CENTRAL EXPERIMENTAL FARM.

AMERICAN ARBOR-VITÆ (*Thuja occidentalis*.)

Trees 5 x 5 feet apart,—all Arbor-Vitæ. These trees have made rapid and fairly uniform growth, and appear to be well adapted to the soil of peat and sand in which they are growing. No cultivation was required after 1894.

Trees 10 x 10 feet apart,—all Arbor-Vitæ. The trees in this block have also made rapid and fairly uniform growth. Cultivation is still necessary.

AUSTRIAN PINE (*Pinus austriaca*.)

Trees 5 x 5 feet apart,—all Austrian Pine. These have made medium growth and are fairly uniform in height. No cultivation was required after 1894.

Trees 10 x 10 feet apart,—all Austrian Pine. The trees in this block have also made medium and fairly uniform growth. Cultivation is still necessary.

Trees 10 x 5 feet apart,—Mixed Forest Belt. The trees in this belt have done better than when planted in blocks by themselves; one reason probably being that the land is higher. Those planted in sandy loam seem to do somewhat better than those on clay loam.

Trees 3 x 3 feet apart,—all Austrian Pine. These trees were planted in nursery rows in 1887, the rows being 3 feet apart and the trees from 6 to 8 inches apart in the rows. In 1893 they were thinned out until they were about three feet apart each way. They have made rapid and fairly uniform growth, but their circumference is not so great as where planted further apart.

NORWAY SPRUCE (*Picea excelsa*.)

Trees 5 x 5 feet apart,—all Norway Spruce. The trees in this block have made rapid and fairly uniform growth and have not needed cultivation since 1894.

Trees 10 x 10 feet apart,—all Norway Spruce. These trees have also made strong and fairly uniform growth, but still need cultivation.

Trees 10 x 5 feet apart,—Mixed Forest Belt. The Norway spruce in the mixed forest belt have done well on the lighter soils. On clay loam they have not grown so well.

WHITE PINE (*Pinus Strobus*.)

Trees 5 x 5 feet apart,—all White Pine. The light, sandy loam soil, mixed with gravel where these trees are growing seems very suitable; they have made rapid and fairly uniform growth and no cultivation was required after 1894.

Trees 10 x 10 feet apart,—all White Pine. These trees have also made rapid and uniform growth but still need occasional cultivation.

AVENUES.

The trees composing the avenues on the farm made good growth during the past season and at no time seemed to suffer from lack of moisture. The caterpillars of the Camberwell Beauty Butterfly (*Vanessa Antiopa*) were very troublesome on the elms during the month of June, but the trees were examined at intervals and the insects destroyed before they had done much injury. The surface soil was kept loose about the trees during the summer to retain moisture and kill weeds.

HEDGES.

The Arbor-vitæ and Norway spruce hedges bordering the east and south boundaries of the farm have again made vigorous growth. After being trimmed the past season the Arbor-vitæ was as high as the top of the fence in most places, and the Norway spruce, though not trimmed this year, is about as high.

The 46 sample hedges, of which an account was given last year in the report of the Director, are all doing well. In Fig. 6, a view is given of some of these from a photograph. Twenty additional hedges were added to the list during the spring of 1895, making 66 in all. The following are the names of those planted this year:—

ADDITIONS TO SAMPLE HEDGES.

- Acer glabrum*.—Smooth Maple.
- Acer monspessulanum*.—Montpellier Maple.
- Betula lutea*.—Yellow birch
- Betula papyrifera*.—Papery or Canoe Birch.
- Cornus sibirica variegata*.—Variegated Siberian Cornus.
- Cotoneaster buxifolia*.—Box-leaved Cotoneaster.
- Cotoneaster microphylla*.—Small-leaved Cotoneaster.
- Cotoneaster nepalensis*.—Nepaul Cotoneaster.
- Cotoneaster Simonsii*.—Simons's Cotoneaster.
- Calycanthus floridus*.—Carolina Allspice.
- Fagus sylvatica*.—European Beech.
- Hippophae rhamnoides*.—S Buckthorn.
- Larix americana*.—American Larch.
- Pinus ponderosa*.—Heavy-wooded or Bull Pine.
- Quercus Robur*.—Black or common Oak.
- Quercus palustris*.—Pin Oak.
- Rhamnus catharticus*.—Cathartic Buckthorn.
- Rhamnus Frangula*.—Breaking Buckthorn (dense form)
- Thuya occidentalis globosa*.—Globose Arbor-vitæ.
- Thuya tatarica*.—Tartarian Arbor-vitæ.

ORNAMENTAL CLUMPS OF TREES AND SHRUBS.

The trees and shrubs in the ornamental clumps are becoming more attractive every year and by their beauty of form, foliage and flower, prove of much interest to visitors.

During the past season the circles cut in the grass around the trees and shrubs were enlarged, which has given them a better opportunity of making satisfactory growth. The surface soil about the trees was kept cultivated and free from weeds and, where necessary, the trees were sprayed to prevent the depredations of plant lice and caterpillars. Owing to the cold weather which followed the warm days in the early part of May, the flower buds on some of the trees and shrubs were injured and the bloom this season was not so good as last year.

LABELS.

During part of last winter indelible labels were provided for most of the trees and shrubs on the ornamental grounds. These are zinc labels fastened to a wire rod about 18 inches long, which is pushed into the soil to about three fourths its depth, leaving the label so that it may be easily read. The writing is done with a mixture in the proportion of 1 ounce copper sulphate, $\frac{1}{2}$ ounce lamp black, and $\frac{1}{2}$ pint rain water. This mixture corrodes the zinc slightly and the writing does not wash off. In addition to the zinc labels, 491 white enamelled labels with black letters were received from England; these have the advantage of being larger and more prominent and are lettered with both common and scientific names, also the name of the country of which the specimens are native. In this way good facilities are now given visitors for obtaining the name of any tree or shrub in which they may be interested.

ADDITIONS TO TREES AND SHRUBS ON ORNAMENTAL GROUNDS.

Many additions were made to the trees and shrubs on the ornamental grounds during the spring of 1895, and in the autumn new clumps were planted, especially north of the poultry buildings and from that point on both sides of the road to the northern boundary of the farm. The additions made this year number 192 trees and shrubs, making a total of 2,398 trees and shrubs on the ornamental grounds.

LAWNS, FLOWER BORDERS AND BEDS.

Owing to the plentiful rainfall the grass of the lawns grew rapidly all summer, and the pony lawn mower was kept in use almost constantly from the 9th of May until September, in keeping the grass on the ornamental grounds and in the Arboretum in order. Very little work is now required with the hand mower as the enlarged circles about the trees and shrubs admits of the work being economically done with the horse mower.

Several small areas were seeded down during the season and the grass had formed fairly good sod before growth had ceased in the autumn.

The flower borders containing many species and varieties of annual and perennial plants had a splendid show of bloom all season and the special beds prepared for pansies, pæonies, geraniums, roses, irises, lilies, and clematis were a source of great delight to those who visited the farm, and the succession of bloom in the different beds, the varied colours of the flowers, and the continuity of the bloom added much to the attractiveness of the grounds. The keeping of the surface soil of the borders and beds loose and free from weeds entailed almost constant work; fungous diseases and injurious insects also were more or less troublesome and needed frequent attention to keep them in check.

During the autumn, eleven new flower beds were made on the large lawn, west of the office building and more or less planting was done in them before winter set in. Six of these have been especially set apart for the most attractive wild flowers found in the different provinces and territories of the Dominion. These will, it is believed, prove of special interest to those visiting the farm from different parts of Canada.

ARBORETUM.

The Arboretum at the Central Experimental Farm now contains a collection of trees, shrubs, and perennial plants of great value embracing not only our native species but a very large number from foreign countries.

During the spring 246 species and varieties of trees and shrubs were added to the number recorded last year, making a total of 935 living in the autumn of the present year. The perennial flower border was extended in the autumn from the main entrance to the northern gate and the greater part of this was planted with 735 additional species and varieties, making a total of 863 now in the Arboretum.

DONATIONS.

While visiting the Central Experimental Farm last summer, Prof. Sargent, Director of the Arnold Arboretum at Boston, Mass., expressed his willingness to assist in making the collection here more complete, and to supply, from that institution, many trees and shrubs, new to the collection at Ottawa. At his suggestion, I visited the Arnold Arboretum in the autumn, and under Prof. Sargent's kind instructions, all the nursery stock of the Arboretum was shown me. A list was taken of such trees and shrubs as could be sent, and late in the autumn, a box containing 179 species and varieties was received, also cuttings of 24 species of willows. This donation will prove a most useful and valuable addition to the Arboretum at Ottawa.

A package containing six species of trees has also been received from Professor Max Sivers, of Roemershof, Russia, also some tree seeds. Two of the species sent are new to the collection here, namely: the Russian Larch (*Larix Ledebourii*), and Siberian Spruce (*Abies sibirica*).

PROGRESS OF THE WORK.

The trees and shrubs in the Arboretum have made very satisfactory growth this year, and the good effects produced by the improved system of drainage recently

carried out, were very noticeable. The losses from winter-killing were but few, notwithstanding the exposure to which many of the trees and shrubs are subjected to in the more elevated and open locations of the Arboretum.

The circles cut in the grass around the trees and shrubs were all enlarged this year, and the surface soil kept loose and free from weeds throughout the season. Very little work was required with the hand-mower, as the pony mower, which does the work most economically, cut the grass to the edge of the enlarged circles without injuring the trees.

The perennial flower-border required considerable attention, but as the rows of plants are wide enough apart to admit of cultivation with the horse cultivator, the work is reduced to a minimum.

During the autumn a wind-break was planted along part of the eastern boundary of the Arboretum, consisting of 62 heavy-wooded or Bull Pine (*Pinus ponderosa*), 64 Riga Pine (*Pinus sylvestris Rigaensis*), and 65 Norway Spruce (*Picea excelsa*), the trees being planted 5 feet apart each way.

The trees and shrubs in the Arboretum have been labelled similarly to those on the lawns and ornamental grounds, using as large a proportion of enamelled labels as practicable so as to make this section of the work as useful to the public as possible. The trees and shrubs are each numbered, so that an accurate record may be kept of each individual.

Notes have been taken during the past season on the hardiness, growth and time of blooming of some of the different species and varieties. This work will be continued, and it is hoped that by this means valuable data will be accumulated.

The following is a partial list of the trees and shrubs with the date when in full bloom. Fuller details may be presented in future.

TREES AND SHRUBS—DATE OF BLOOMING.

May 4th.—*Forsythia intermedia*. Intermediate Forsythia.

May 8th.—*Forsythia viridissima*, very green Forsythia; *Pyrus japonica*, Japanese Quince.

May 9th.—*Prunus Pissardii*, purple-leaved plum; *Ribes alpinum*, Mountain currant.

May 10th.—*Pyrus baccata aurantiaca*, Siberian Pyrus; *Berberis Aquifolium*, Oregon grape; *Amelanchier canadensis nana*, Dwarf june berry.

May 11th.—*Caragana arborescens*, Siberian pea tree; *Sambucus racemosa*, Red-berried elder.

May 12th.—*Spiraea oblongifolia*.

May 13th.—*Syringa vulgaris hyacinthiflora*, Hyacinth-flowered lilac.

May 14th.—*Spiraea tenuissima*. *Spiraea salicifolia*, Common meadow sweet; *Daphne Cneorum*, Garland flower; *Syringa vulgaris Lemoinei*, Lemoine's lilac.

May 18th.—*Syringa vulgaris alba*, white lilac; *Berberis Thunbergii*, Thunberg's barberry.

May 22nd.—*Viburnum Lantana*, Pliant viburnum; *Amygdalus nana flore pleno*, Double flowering almond.

May 24th.—*Cytisus elongatus*.

May 26th.—*Lonicera tatarica grandiflora*, Large-flowered bush honeysuckle.

May 29th.—*Spiraea Van Houttei*, Van Houtte's spiraea; *Pyrus Aucuparia*, European mountain ash.

May 30th.—*Cornus sanguinea*—Blood-coloured dogwood.

May 31st.—*Berberis vulgaris purpurea*, Purple-leaved barberry; *Neillia amurensis*, Amur spiraea.

June 1st.—*Pyrus americana*, American mountain ash.

June 2nd.—*Viburnum Opulus sterilis*, Snowball.

June 3rd.—*Acer spicatum*, Mountain maple; *Diervilla rosea*, Rosy weigelia.

June 4th.—*Robinia Pseudacacia*, Common locust.

June 5th.—*Acer Ginnala*, Ginnalian maple; *Rosa rugosa*, Japanese rose.

June 6th.—*Viburnum Opulus*, High bush cranberry ; *Syringa Josikæa*, Josika's, lilac ; *Lonicera Alberti*, Albert's honeysuckle.

June 7th.—*Lonicera Periclymenum*, English honeysuckle.

June 10th.—*Philadelphus coronarius*, Mock orange ; *Spiraea media rotundifolia*, Round-leaved spiraea.

June 12th.—*Lonicera hirsuta*, Hairy honeysuckle ; *Philadelphus grandiflorus laurus* Large loose flowering mock orange.

June 13th.—*Philadelphus primuliflorus*, Primula-flowered mock orange.

June 14th.—*Philadelphus coronarius flore pleno*, Double flowering mock orange or "Syringa."

June 17th.—*Genista tinctoria*, Dyers' Green weed ; *Philadelphus nivalis*.

June 18th.—*Philadelphus Lemoinei erectus*, Lemoine's erect mock orange.

June 19th.—*Philadelphus Gordonianus*, Gordon's mock orange ; *Philadelphus Yokohamæ*, Yokohama mock orange.

June 20th.—*Philadelphus pubescens*, Downy mock orange, *Ceanothus americanus*, New Jersey Tea ; *Dentzia crenata flore pleno*, Double crenate deutzia ; *Philadelphus grandiflorus*, Large flowered mock orange ; *Catalpa speciosa*, Hardy western catalpa ; *Catalpa speciosa variegata*, Variegated western catalpa.

June 21st.—*Sambucus nigra aurea*, Golden-leaved elder ; *Sambucus nigra laciniata*, Cut-leaved elder.

June 22nd.—*Philadelphus cordifolius*, Heart-leaved mock orange ; *Philadelphus inodorus*, Odourless mock orange.

June 23rd.—*Syringa japonica*, Japanese lilac ; *Spiraea decumbens*, Decumbent spiraea.

July 2nd.—*Catalpa hybrida*, Tea's hybrid catalpa.

July 3rd.—*Catalpa Kämpferi*, Japanese catalpa.

W. T. MACOUN.

Foreman of Forestry.

VISITS TO THE BRANCH EXPERIMENTAL FARMS.

VISIT TO AGASSIZ.

On the 20th of July, 1895, I left Ottawa on my annual visit of inspection to the branch farms in the western parts of the Dominion. The journey was made to Agassiz without a break in order to be present at some important meetings which had been planned to take place at Agassiz during the latter part of July. These meetings consisted of gatherings of the Associations of Farmers' Institutes, and of the Fruit Growers and Dairymen of British Columbia, and were well attended by representative men from the different parts of the province, from Vancouver Island as well as from the main land. The Lieutenant-Governor was present and presided over the meetings, while the local government was represented by the Minister of Education and the Deputy Minister of Agriculture. The Experimental Farms were represented by the Director, the Entomologist and Botanist, Mr. James Fletcher, and by the Superintendent of the branch Experimental Farm at Agassiz, Mr. Thos. A. Sharpe. During the sessions of these important gatherings addresses were given by each of the representatives from the farms, on topics of interest to those present, and during the intervals between the sessions many of the visitors devoted their time to the inspection of the various branches of experimental work in progress at this branch farm.

Nearly two weeks were spent on the Experimental Farm at Agassiz, examining into the results of the work of the year with the grain crops, and in taking notes on the progress of the various fruit plantations both in the valley and at different heights on the bench lands on the mountain side. The orchards in the valley had made strong growth and a large number of the trees were well laden with fruit. The crop of some of the later varieties of cherries was still on the trees and presented a very fine appearance, while the plum crop was so heavy that the trees had to be supported in all directions to prevent the limbs from breaking with the weight of the fruit.

The orchards on the bench lands more recently planted were also making fine growth and some of the young trees were bearing well, notably the plums and a few of the peaches. These orchards on the broken bench lands on the mountain side, occupying as they do, land which is of no value for general agricultural purposes, are attracting much attention from the fruit growers of British Columbia and the degree of health and vigour manifested by these trees was very gratifying. The total number of varieties of fruits now under test on the Experimental Farm at Agassiz is 1,600, of which 1,204 are large fruits. Nearly 500 varieties of ornamental trees and shrubs are also under test. A large number of varieties of grain and other agricultural crops were also growing there, all of which were subject to careful examination, and the new work for the coming year was planned.

VISITS TO OTHER PARTS OF BRITISH COLUMBIA.

Visits were paid to Victoria, Vancouver and New Westminster, also to the newly erected creamery near Ladner's Landing on the Delta lands of the Fraser, the first co-operative creamery built in British Columbia, where about 300 lbs. of butter per day was being made. A visit was also paid to one of the salmon canneries in that district, this being the time when the run of the much esteemed Sock-eye salmon was at its height. It was an interesting scene. About 200 Chinamen and Indian women were busily engaged in cleaning, cutting up and canning the fish, in which many of them showed great dexterity, and considering the inevitable handling of so much offal, the operations were conducted with commendable cleanliness and care. Fully 1,800 boats were at that time engaged on the Fraser River in fishing, which continued day and night and the deliveries to the canneries were very heavy.

The grain crops throughout the province were fairly good, and the hay in some districts especially heavy. Fruit growing is making rapid progress and the crop of fruit, especially of plums, was a most abundant one; cherries also had yielded well. The crop of pears was below the average, but apple trees, especially those in the younger orchards, were giving satisfactory returns.

THE OKANAGON VALLEY.

Journeying eastward, a trip was made south from Shuswap Lake into the Okanagan valley and down the lake—which is about 75 miles long—to its base at Penticton. Opportunity was thus given for visiting a number of farms and several large orchards, including those of His Excellency the Governor General. Most of the orchards planted in this valley are making good growth, and in some of them many of the young trees have begun to bear. The fruits grown throughout this district are remarkably clean, free from spot and bright in colour, the dry atmosphere preventing fungous growth. In many parts of this valley irrigation to a greater or less extent is needed in order to ensure success. This adds to the expense of working the land, and as the supply of water is limited, the area which can be brought under successful cultivation is necessarily restricted.

AT CALGARY.

Two days were spent at Calgary where some inquiries were made in reference to the progress of irrigation in Alberta and in examining the crops grown on land to which water had been applied during the past season. These crops were found to be remarkably luxuriant in growth, showing the fertile character of the soil. During the past five years 76 irrigation ditches have been constructed or are now under construction, largely through private enterprise in Alberta measuring in all more than 200 miles. These when completed and in operation will it is estimated irrigate about 135,000 acres of land. The energy manifested in this direction by the settlers in that country deserves the highest commendation and shows the very great interest taken in this subject, and that those who have the best opportunity of judging are firmly convinced that the artificial application of water to growing crops will so far increase the average

production as to warrant the large expenditures which are being made in providing these water supplies. On a ranch a few miles from Calgary owned by Mr. Hull some extraordinary fodder crops were seen growing under irrigation. Among them was a large field of awnless brome grass (*Bromus inermis*) which had been grown as hay and had produced a very heavy yield.

VISIT TO INDIAN HEAD.

The branch experimental farm at Indian Head was next visited, where several days were spent in examining the grain crops, which were remarkably heavy, noticing the progress of various plantations of forest trees, shrubs, small fruits and vegetables, and in planning work for the future. A large proportion of all the crops on the farm were found to be very promising, and the horses, cattle, swine and poultry all appeared to be in a healthy and thrifty condition. The forest trees planted in the shelter belts, clumps, avenues and hedges on this farm now number over 100,000. During the past year they have made remarkable growth, and are so distributed throughout the farm that they are having a favourable effect on many of the crops, by breaking the force of the winds and adding moisture to the soil by collecting and holding the snow during the winter months. Further, through this means the whole aspect of the farm is rapidly improving, and from this time forward many of the trees earliest planted are expected to begin to bear seed, and, in a comparatively short time, an abundant supply of tree seeds will be available from year to year for extending this good work. Up to the time of my departure from Indian Head, on the 24th of August, no frost had occurred in that district and more than half of the wheat was cut. About a week later a temperature of five degrees of frost was recorded, which considerably injured the late crops still standing or recently cut.

VISIT TO BRANDON.

A week was spent at Brandon inspecting the work in progress on the branch farm there. The crops, like those at Indian Head, were very heavy, and a large proportion of the grain was cut. The corn had not made so strong a growth as in 1894, but the roots were very thrifty, and gave promise of an abundant yield. Many of the small fruits had made excellent growth, but on account of heavy spring frosts the crops had been light. The tree belts, avenues, hedges and ornamental plantations had all made strong growth, they add much to the beauty of the place, and afford in many parts excellent protection. Wild plum trees are succeeding very well here, and several specimens were fruiting nicely. It is hoped that by careful selection the quality of this fruit may be gradually improved and its usefulness much extended. Neither here nor at Indian Head have any of the hardiest sorts of apples or pears succeeded, nor any of the better varieties of plums or cherries. The sand cherry, *Prunus pumila*, is doing well and is quite hardy and some of the selected forms of this fruit are of very fair size and quality. All the live stock appeared to be in a thriving condition and gave evidence of good care. Frost visited this farm earlier than at Indian Head and injured some of the grain, especially in the lower spots in the valley. On the whole, however, the returns were remarkably good and much of the grain has since turned out well and of very satisfactory quality.

TRIP THROUGH SOUTHERN MANITOBA.

In company with the superintendent of the Brandon experimental farm, Mr. S. A. Bedford, a drive was taken covering about 220 miles through some of the more important grain districts in southern Manitoba. The route taken was from Brandon south 70 miles to Killarney, thence eastward to Morris and through the Mennonite settlement to Gretna. Ninety samples of grain were taken from the fields en route and carefully examined. The effect of frost was detected in some of these samples and a few were seriously injured, but the injury appeared to be confined to a few districts where the quantity of wheat grown is comparatively small. Of the larger areas visited

where the bulk of the wheat crop of southern Manitoba is harvested, most of the samples taken were free from injury by frost, and at that time the grain was nearly all cut. The crops of all the cereals were very heavy ; a considerable area of flax was seen, most of which promised a good return.

VISIT TO THE EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

As soon as practicable after returning from the west, a visit was paid to the branch experimental farm at Nappan, Nova Scotia. At the time of my arrival there all the varieties of grain and fodder crops had been harvested and the roots of which there were some very fine fields notwithstanding the drought which prevailed, were about ready to gather in. The yields of grain during the early part of the season had been good, and as the harvest weather had been favourable, the crops were well saved. Hay on the uplands has given an average crop, but on the marsh lands the yield has been somewhat below the average. This farm is improving much from year to year, a considerable proportion of the land now under cultivation has been thoroughly under-drained which has relieved it of surplus moisture and admits of early seeding in the spring.

The orchards and fruit plantations have been extended and now include 288 varieties of large fruits and 75 of small fruits. A large number of ornamental trees and shrubs have also been added to the collection, which now includes 280 species and varieties. Most of these have been planted in groups and clumps about the buildings, where they beautify the grounds and prove a constant source of pleasure to visitors.

MEETINGS ATTENDED.

In addition to the meetings already referred to, which were held at Agassiz in British Columbia, the following have been attended during the year :—

The annual meeting of the Dominion Swine Breeders' Association held at Guelph, Ontario, on the 12th and 13th of December, 1894, when an opportunity was afforded of presenting the results of the experiments which have been conducted for several years past, in the fattening of swine at the Experimental Farm.

On the 23rd to 25th of January, 1895, the annual meeting of the Western New York Horticultural Society was attended at Rochester, New York, where an address was given on "Ornamental Trees and shrubs which have proven hardy at Ottawa."

The annual meeting of the district of Bedford Dairy Association was held at Cowansville, on the 26th and 27th of February, where addresses were delivered on "The Fertilizing constituents taken from the soil by different crops" and "On natural and artificial Fertilizers."

An address was also delivered in Montreal, before the Central Canada Agricultural Association, on the 28th February, on "The effects of Fertilizers on the more important crops."

CORRESPONDENCE.

The following is a summary of the letters received and despatched at the Central Experimental Farm, from November 30th, 1894, to November 30th, 1895, also of the bulletins and reports sent out by mail during the same period :—

	Letters received.	Letters sent.
Director.....	22,389	7,378
Agriculturist and Dairy Commissioner.....	5,042	5,161
Horticulturist.....	2,056	2,500
Chemist.....	1,209	1,331
Entomologist and Botanist.....	1,896	1,268
Poultry Manager.....	1,600	1,366
Accountant.....	1,289	1,100
	<hr/> 35,481	<hr/> 20,104

The letters received by the Director include a considerable number of applications for samples of seed grain. Most of these are acknowledged by printed circulars, which are not entered among "letters sent," but are placed under the heading of "circular letters sent." This accounts for the difference between the number of letters received and the number of letters sent.

CIRCULAR LETTERS SENT.

The larger part of these are instructions sent with samples of seed-grain, tree seeds, &c., distributed.....	38,448
Number of reports and bulletins mailed.....	227,631

ACKNOWLEDGMENTS.

I desire to acknowledge gratefully the receipt of a large number of species and varieties of trees and shrubs, many of them rare, kindly forwarded by the director of the Arnold Arboretum, Prof. C. S. Sargent, of Jamaica Plains, Mass., for the Arboretum at the Central Experimental Farm, also, a number of packages of seeds of trees and shrubs from the same source.

A package containing trees and tree seeds from Prof. Max Sivers, of Roemershof, Russia; packages of seeds from the director of the Royal Gardens, Kew, England; from the director of the Botanic Gardens, Jamaica, West India Islands; from the Imperial Botanic Gardens, Sapporo, Japan; from the California Experiment Station at Berkeley, California; and from the Minnesota Experiment Station at Minneapolis, Minnesota.

My thanks are also due to Dr. G. M. Dawson, director of the Geological Survey, for his kind assistance in issuing instructions to members of the Survey staff engaged in exploring work to preserve and forward to the Experimental Farm seeds of trees, shrubs and plants obtained in remote districts in different parts of the Dominion. From this source many useful varieties, otherwise difficult to procure, have been obtained. Special service has thus been rendered by Prof. John Macoun, botanist of the Survey, and by Mr. J. M. Macoun, assistant botanist, from whom seeds of a large number of rare and useful species have been received, collected chiefly in the North-west provinces of the Dominion.

Again I desire to acknowledge the efficient service rendered me by all the officers of the Central and branch Experimental Farms and my obligations to them for their hearty co-operation, and diligence in carrying out the many and various experiments which have been planned in connection with the work. The results speak louder than words of the earnest efforts which have been made by all to do their work thoroughly and well.

A personal acknowledgment is specially due to those members of the staff who have so efficiently aided me in those branches of the work of which from the beginning I have assumed the personal charge, also for the valued assistance which has been given me in carrying on those portions of the agricultural work undertaken at the request of the agriculturist. To the farm foreman, Mr. John Fixter, who has managed and watched over the field experiments and made careful notes of the growth and development of the crops to maturity. To Mr. Macoun, the foreman of forestry, who in addition to his other duties has taken charge of all the smaller experimental plots and who has made regular and careful records of the progress at every step of the many varieties under test. I also desire to bear testimony to the faithful and accurate work performed by Mr. W. T. Ellis, who has had the care of the seed testing and propagating houses; and to Mr. J. Kirkpatrick, who has conducted the work of the distribution of samples of seed grain. The employees also, in every department of the work, have discharged their duties faithfully and well.

WM. SAUNDERS,
Director Dominion Experimental Farms.

REPORT OF THE HORTICULTURIST

(JOHN CRAIG.)

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit a report of some of the work carried on in the Division of Horticulture of the Central Experimental Farm for the year 1895.

The most striking feature of the year from the fruit growers' standpoint was the occurrence in May of destructive frosts throughout Central Canada. The Niagara district, in addition to the apple and pear growing districts to the North and East, suffered severe injury. Peaches in the belt between Hamilton and Niagara Falls were not more than a quarter of a crop, and some sections a total failure.

The quality of autumn and winter apples of this year has not been excelled or equalled for a number of years past, owing in part to the increase of the practice of spraying and to the presence of unfavourable conditions for the growth of parasitic diseases.

The export of apples to the British market has been much less than last year, but the better quality has given shippers and growers higher prices.

The various provincial organizations for the advancement of the fruit growing interests have done excellent work and are usually well supported by their respective governments. The membership of these associations should be largely increased, as the benefits derived cannot be compared to the annual expenditure of one dollar which constitutes the membership fee of each.

SHIPMENT OF PERISHABLE FRUITS TO ENGLAND.

In response to a request made by the Fruit Growers' Association of Ontario, a trial shipment was made, using one of the chambers fitted up in the steamer "Mongolian" for carrying butter, for this purpose. Each specimen was wrapped in tissue paper and was carefully packed in specially prepared cases of small size. The fruit was collected at St. Catharines, Grimsby and Winona, and shipped from Montreal on September 5th. The shipment amounted to 610 packages composed of pears, peaches, plums, grapes, and tomatoes. It arrived in Liverpool in bad condition. The peaches, plums, and grapes suffered most. The shipment was unsuccessful owing to the refrigerator car being insufficiently iced while in transit between Hamilton and Montreal, thus bringing the fruit to Montreal in a warmed condition; also to the lack of cooling plant in the cold storage chamber on board the steamer. As the Government assumed the amount of the transportation charges, the growers suffered only the loss of the fruit, the returns from the sale of the fruit more than defraying the cost of the special packages made to order for this shipment. 40 bushel boxes of apples St. Lawrence, Alexander and Wealthy, shipped from Montreal in the same compartment arrived in good condition and were sold at remunerative prices. The net returns for these amounting to a little over \$1.00 per box.

RAPID DEVELOPMENT OF THE FRUIT INTERESTS OF THE DOMINION.

The fruit interests of the country have been increasing with marvellous rapidity during the past ten years. The production, especially of summer and autumn fruit of a more or less perishable character, has long since passed the limits of profitable home consumption. This is the case in nearly, if not quite, all of the fruit growing provinces of the Dominion.

NOVA SCOTIA

is justly celebrated for the production of apples of fine quality, which have long since secured for themselves a reputation in the British markets. Her acreage devoted to apples is rapidly increasing and is being supplemented by an extension of similar work along the lines of pear, peach and plum culture. That many of these can be successfully produced in the Annapolis Valley has already been demonstrated by practical trial. The area devoted to the cultivation of pears is being widened each year. Plums are widely and successfully grown, and peaches give promise of success in favoured localities. Foreign markets in which to dispose of these fruits, will be a necessity before very long.

NEW BRUNSWICK.

The production of apples in this province probably is not at present more than sufficient to meet the domestic demand ; at least, if the supply is judiciously distributed.

In small fruits, such as raspberries and strawberries, this province has, owing to her geographical and climatic position, the advantage of ripening these fruits at a period sufficiently late to enable her to ship them to Boston, and other markets to the south, at a time when there is little or no competition from the same class of fruits. Facilities for transportation, and knowledge of the best means of packing and shipping, are yet needed.

QUEBEC.

The area devoted to fruit-culture in this province has also increased rapidly. The climate in most portions precludes the successful cultivation of the best winter export apples of to-day ; but large quantities of fine autumn and early winter apples are being produced annually in increasing quantities. The origination of suitable winter export varieties belongs to the work of the future. A large proportion of these autumn apples are at present wasted. I am confident that a profitable trade could be worked up in England by using small packages, and transporting them in adequately cooled chambers. In fact, some advances along this line have already been made by individual enterprise. Encouragement given by offering better means for transporting them, together with a knowledge of the desires of the British consumer, is needed to ensure success.

ONTARIO.

The Bureau of Statistics for this province gives the cultivated area devoted to fruits in 1892 as amounting to nearly 200,000 acres. In 1893, the value of peach trees in orchard, according to the same authority, represented a capital of over two and one-half million dollars.

The planting of pears, plums and grapes has been steadily on the increase, and the annual product of the fruit area is now greatly in excess of domestic consumption.

In addition to the fruits enumerated, it is safe to say that Ontario, as well as Quebec, possesses peculiar natural advantages for the cheap production of tomatoes. These can be successfully cultivated over the greater portion of these provinces, and at a profit, if they can be disposed of for even 25 cents per bushel. At this rate, the profits derived will greatly exceed those secured, at the present time from potato culture.

BRITISH COLUMBIA.

This province, which will undoubtedly lead all others in the production of plums, prunes and nuts, will probably be able for some years to come, to dispose of her surplus apples and pears in Manitoba and the North-west Territories.

FOREIGN MARKETS.

Britain and Germany are at the present time the most suitable shipping points. The methods of packing and handling and the means of transporting these products are undoubtedly the most important points connected with the project.

The failure of the trial shipment to reach its destination in sound condition gives rise to the query of how may they be successfully transported thither?

I believe that fruit may be carried in good condition by having a ventilated compartment with a moderately cool temperature of say 40 to 45 degrees, and fully supplied with an abundant amount of dry and pure air. It may also be carried successfully in a closed compartment, provided the temperature is only slightly above freezing. On the contrary, without thorough refrigeration the closed compartment offers the most favourable conditions for the propagation of the germs of fermentation and decay.

As a natural consequence following upon the successful introduction of pears, grapes and tomatoes, into the British markets, should come the erection in fruit districts of buildings artificially cooled, in which fruit might be stored sufficiently long to tide over a glutted market or a period of weak demand in home markets.

District cold storage warehouses supplemented by a refrigerator car and steamer service between home and foreign markets would enable growers to market with increased profit a greater quantity of fruit, which would thus allow of the fruit area being increased without a corresponding falling off or lowering of prices.

CRANBERRY CULTURE.

A subject which has been attracting considerable attention, and which has called for a good deal of correspondence from this office during the past four or five years, has been Cranberry Culture.

In the Maritime Provinces and Prince Edward Island there are many sections, that on account of their alluvial and topographical character are particularly adapted to the cultivation of the cranberry. The principal expense in connection with this industry lies in the preparation of the ground, and the chief drawback is the occasional occurrences of a late spring frost, which destroys the blossoms and therefore the possibility of securing a good crop.

At the meeting of the Nova Scotia Fruit Growers' Association, held at Wolfville, N.S., January 29th, 30th and 31st, 1895, some exceedingly interesting information on "Cranberries and how to grow them" was submitted by Mr. Henry Shaw, a successful cranberry grower of Berwick, N.S. A report of his address may be found in the proceedings of the Fruit Growers' Association for 1895.

Without going into the details of Cranberry Culture, it might be well to outline briefly some of the requisites necessary to success in their cultivation. These are as follows:—

1. Alluvial soil composed of a mixture of muck and sand.
2. Surface drainage.
3. Annual flooding.

These in general are necessary to obtain the highest returns, but paying results are often secured without the fulfilment of all the above conditions. A sandy subsoil overlaid with muck is unsuitable unless some of the latter is removed and some of the sand is brought to the surface by deep ploughing or other means before it is ready for planting. A rich peaty soil causes too much growth of vine, and as the fruit sets on the ends of the shoots this rank growth throws out but few fruit buds, but if the surface is sanded over or mixed with sand, less growth is made with the result that a great many

more fruit buds are formed. In the case of very sandy soil it would be well to top dress it liberally with muck or swamp mud. In preparing the ground, if it be wet and spongy, it should be surface-drained so as to leave the water ten or twelve inches below the surface. The plants are usually set in rows two feet apart each way. Holes are made with a stick or dibble, the roots inserted into these and the earth pressed about them with the foot. The plant in each case is practically a cutting, as the roots are so fine and fibrous that they lose their vitality very quickly on exposure to the air, but it soon throws out new roots from the stem. The vines may also be sown in drills and covered about as deeply as corn; this method is more rapid, but the results are not always satisfactory. The best time for planting is in spring as early as possible, but the operation may be carried on up to June 1st with fair results. They may also be set out in autumn between September and the middle of October. Where plants are set out in autumn on soil liable to heave with frosts, the plantation should be flooded deeply in order to prevent the "sets" from being thrown out. Flooding is now considered by nearly all commercial growers to be indispensable to certain success. White, the authority on cranberry growing, says:—"Flooding not only prevents injury from the cold blasts of winter and destroys insects and their eggs, but the water has also an important fertilizing effect which is particularly valuable if the plantation is deficient in muck." Annual deposits of vegetable matter are also obtained in this way. The water is let on late in autumn and drained off after danger of hard frost in spring is over. Dressings of sand applied each year, or on alternate years will assist in keeping the weeds down and will aid the plants in rooting between the rows. The "Bugle" and "Cherry" cranberries are two of the most popular varieties in cultivation in the cranberry districts of New Jersey and Massachusetts. In Nova Scotia, the native species is preferred to New Jersey or Cape Cod varieties, in the belief that it is better suited to the climate and is freer from insect injury. Anyone who wishes to read up the subject more fully will find it treated in a small book called "Cranberry Culture," by J. J. White, and published by Orange Judd Co., New York, U.S.

Correspondence.—I am pleased to note that the interest manifested by the public and by fruit growers generally in this division of the farm work has not fallen off during the year, but on the contrary has increased. The large number of letters received and answers given on questions relating to definite and technical lines of investigation show that the usefulness of the division is appreciated throughout the Dominion.

Meetings Attended.—I was present by invitation and gave addresses at the following provincial organizations:—

Nova Scotia Fruit Growers' Association at Wolfville, N. S., January, 28th to 31st inclusive.

Pomological Society and Fruit Growers' Association of Quebec, at Como and Oka, August 20th and 21st.

Ontario Fruit Growers' Association at Woodstock, Ont., 10th, 11th and 12th December.

In addition to these, addresses were delivered at a number of county farmers' institute meetings throughout the country.

Acknowledgments.—I beg to again gratefully thank the secretaries and officers of the various provincial societies devoted to the fruit growing interest of the Dominion, for valuable assistance and kindly encouragement received during the year. I would especially thank those fruit growers in different parts of the Dominion who so effectively assisted me at considerable personal inconvenience in obtaining valuable and interesting records of the dates of the blossoming period of fruit trees. To Dr. B. D. Halsted, of New Brunswick, New Jersey, U. S., and Prof. Seymour, of Harvard University, I am particularly indebted for assistance in identifying parasitic fungi.

I have also to record with thanks the following donations:—

C. L. Stephens, Orillia, Ont. Red currant seedlings.

M. G. Bruner, Olinda, Ont. Apple scions.

J. M. Waters, Fernhill, Ont. Raspberry seedlings.

- E. C. Hale, Lennoxville, Que.....1 seedling plum tree ; purple and English
beech nuts.
- J. Erwin Lord, Pampanoosuc, Windsor
Co., Vt., U. S.....11 varieties of apple scions ; 1 var. crab ;
late Victor grape cuttings.
- J. Munro, Chesterville, Ont.....Scions of sdlg. crabs.
- Mrs. Sarah Foster, Knowlton, Que....Apple scions.
- W. J. Kerr, Chesterville, Ont.....Apple scions.
- Wm. Pattison, Clarenceville, Que.....Apple scions.
- F. L. Dery, Point Viau, Que.....Apple scions.
- H. C. Sebean, New Market, N. S.....Apple scions.
- Prof. L. C. Corbett, Brookings, S. D.,
U. S.....Yellow sand cherry scions.
- A. Rose, Dixon Corners, Ont.....Apple scions.
- E. W. Hartman, Clarksburg, Ont.....Apple scions.
- B. Losee, Cobourg, Ont.....Apple scions.
- A. P. Stevenson, Nelson, Man.....Seedling raspberry; Mountain currant.
- J. P. Cockburn, Gravenhurst, Ont....Muskoka Bell black raspberry.
- E. B. Stevenson, Freeman, Ont.....Strawberry plants.
- C. E. Brown, Yarmouth, N. S.....Apple scions.
- G. A. Wright, Fort Covington, N. Y.,
U. S.....Apple tree.

Spraying pumps were received from :—

Toronto Wind Engine and Pump Co. Toronto, Ont.
Sramoter Co., London, Ont.
Goold, Shapley, Muir Co., Brantford, Ont.
Vermorel Knapsack Pump Co., France.
Holmes and Holladay, Clarksburg, Ont.

To Mr. Wm. Taylor, foreman in the Division of Horticulture, I am much indebted for valuable assistance in recording valuable data, used in preparing this report. Mr. J. F. Watson has also rendered effective service in the clerical work of the report.

I have the honour to be, sir,

Your obedient servant,

JOHN CRAIG,

Horticulturist.

THE APPLE.

The following pages on this subject are directed to beginners in fruit culture who are seeking information, elementary in character, but none the less necessary to successful orcharding. I may say that the article itself, as well as its didactic character, has been suggested by the numerous inquiries along this line which have reached this office during the year.

Apple culture has advanced with rapid strides during the past twenty years. It is true that during the first half of that period greater attention was given to increasing the orchard area than to the necessity of good cultivation or the desirability of lessening the number of insects and fungous enemies by exercising preventive methods. Orchardists have been latterly reminded of this fact in an unpleasantly emphatic manner at harvesting time each year, and it is gratifying to note the improvement in cultural methods, which are plainly apparent in all fruit growing centres.

THE BOTANICAL POSITION OF THE APPLE.

The apple belongs to that large group of plants included in what is known as the Rose family, which embraces the more important fruit bearing plants indigenous to, or cultivated in the temperate regions of the globe. It is therefore closely related to the raspberry, blackberry and strawberry; the plum, peach and the cherry.

Our cultivated varieties have originated or have been developed from a wild type, *Pyrus malus*, L., indigenous to Europe. Our cultivated crabs are attributed to two sources: *Pyrus prunifolia*, Wild, which is the parent of the larger cultivated crabs, such as Transcendent and Hyslop; while the Yellow and Red Siberians are derived from the smaller Siberian crab—*Pyrus baccata*, L. In this essay we have only to consider the descendants of *Pyrus malus*, L., the wild apple or crab, as it is called in its uncultivated condition. It is said that the apple is of more use and benefit to the people of England than all the other fruits put together, that it is to fruits in general what good wheaten bread is to other accustomed food; while it satisfies, it never cloyes.

There are those who claim that the apple was not indigenous to, but only naturalized in Europe at an early date, and that it originally came from Persia and North Eastern India. However, this may be, it certainly has made a home in Europe for many centuries, as evidenced by the variations in the original type, probably the result of climatic adaptation, as seen in different parts of Europe. At what period the improvement in the original type began and when variations began to appear must be left to conjecture, but without doubt it was at a remote period. Apple culture commenced in England with the advent of the Normans, and the progeny of these Norman introductions later found their way to Canada and the United States with the Pilgrim Fathers and the pioneer Acadians. It is interesting to trace the gradual dissemination of knowledge and the distribution of varieties from each of the early colonial settlements. Thus, we find in Acadia (Nova Scotia), Quebec, Montreal and Amherstburg, on the Detroit River, specimen trees, in some instances grown from seed planted by the first settlers, in other cases representing the second generation, but always interesting on account of their relative antiquity in this country of rapid development. When we consider that the major portion of our apples came from, or are the product of those raised in the comparatively mild climate of the British Isles and the still milder climate of Normandy, it is remarkable that so many have been cultivated successfully in this climate; as examples of these, Ribston Pippin and Gravenstein may be mentioned, both of which reach a higher state of perfection in certain parts of the Dominion than in the countries of their nativity. It is, nevertheless, true that the bulk of the apples now shipped to England are the product of varieties originated in America, and the number of home productions usually increases as we go towards the North and the West, where climatic extremes preclude the possibility of cultivating the more tender varieties indigenous to West Europe.

With the introduction of the Duchess of Oldenburg and Alexander, two varieties most attractive in appearance, attention was directed to the apples of East Europe and Russia, from whence these came. In 1870, the United States Department of Agriculture, at Washington, imported from Russia, through Dr. Regel, Director of the Botanical Garden at St. Petersburg, scions of 252 varieties of apples. These were tested on the grounds at Washington, and distributed among nurserymen in the Eastern, Northern and Western States.

This importation was followed by systematic and self-denying efforts on the part of the late Charles Gibb, of Abbotsford, Que., and Prof. J. L. Budd, then and now of the Iowa Agricultural College, Ames, Ia., U.S. A great many varieties have been introduced, many have been discarded, some are undergoing further trial, a few have been taken up by nurserymen and have become commercial varieties, while others have been recommended to planters in the colder districts, but have not yet become commercial. (For further information on this subject, the reader is referred to the Report of the Horticulturist of the Experimental Farm for 1891.) That the Russian apples, as a class, are hardier than Eastern, American or Canadian apples, there is no question; that they are bearers of handsome fruit, but poorer in quality, considered as a whole, than our apples, must also be conceded; but, summing up the ultimate advantages derived from their introduction, every fair-minded person must admit that the benefits from them received, and expected, far out-weigh any imaginary or momentary inconvenience the commercial fraternity may have experienced by their introduction. Among some of the prominent American and Canadian fruit growers who have interested themselves in testing Russian apples, may be mentioned the late Charles Gibb, Abbotsford, Que.; John M. Fisk, Abbotsford, Que.; Robert Hamilton, Grenville, Que.; R. W. Shepherd, Como, Que.; Robert Brodie, St. Henry of Montreal, Que.; D. W. Beadle, late of St. Catharines, Ont.; Dr. T. H. Hoskins, Newport, Vt., U.S.; A. Webster, South Northfield, Vt., U.S.; A. G. Tuttle, Baraboo, Wis., U.S.; A. W. Sias, Rochester, Minn., U.S.; Prof. J. L. Budd, Ames, Ia., U.S.; J. M. Underwood, Lake City, Minn., U.S., and C. Perry, Beaver Dam, Wis., U.S.

THE APPLE BLOSSOM.

The apple blossom exhibits the characteristics peculiar to the pomaceous division of the Rose family. On making a vertical section of an apple blossom we find the organs arranged as follows:—Beginning at the outside; 1st. A calyx or enveloping sheath composed of five parts or sepals. 2nd. The delicately coloured corolla, also of five parts, called petals. These two series serve to protect the delicate organs within from heat and cold, and to attract to the blossom insects, which serve an important mission in the distribution of pollen. The stamens or pollen-bearing organs, 15 to 20 in number, are arranged next in order on the top of the closed receptacle. In the centre are found the pistils or carpels, five in number and corresponding to the five divisions in the core of an apple. An elementary knowledge of the parts of the blossom is necessary to the intelligent application of the best practices in orcharding. The results of recent investigations with pears and grapes have been in accordance with the principle enunciated by Darwin, viz.: That cross fertilization among varieties was favourable to the production of vital seed, and therefore strong offsprings. These investigations also brought out the fact that some varieties of grapes, pears and apples are self-sterile.

INTERMINGLING VARIETIES.

The remedy for this is obvious, viz., in planting the orchard, to exercise care in arranging the varieties so that those which bloom at the same period should occupy contiguous positions, and to refrain from planting large blocks of single varieties on account of the possibility of imperfect fertilization, and consequent light crops. It is a safe practice in all large orchards to mingle varieties with a view of securing this end. In small fruits, plums and pears, its advantages have been abundantly manifested. With apples, experience teaches that the orchard with the varieties judiciously mingled usually gives the best returns.

PROPAGATION.

Apples are propagated by grafting or budding up on seedling roots. To do this, apple seed is collected from the pomace at cider mills. It may be stored in damp sand in a cold cellar during winter, or sown in seed beds or in drills in the autumn. In practice nurserymen take the seedlings up at the close of the first growing season and grade them according to size. The largest are usually stored for root grafting during winter, the smaller are packed away with a view of setting them in nursery row with the intention of budding those of suitable size the following August.

ROOT GRAFTING.

The operation of root grafting is a very simple one. Having strong one-year old seedling roots, the next thing is to secure scions. These are cut from well ripened wood of the current season's growth. They are tied in bundles and keep well when packed tightly in boxes with dry forest leaves. There are several methods of joining the root and scion. The principal thing to remember is that the inner bark of scion and of root must be in direct apposition, at least on one side. In order to hold the two pieces together and make a good splice, a tongue is necessary. The operation involved in whip grafting briefly described then consists in cutting both scion and root diagonally and making a cleft in both of them. The two are then joined by forcing the tongue of the scion into the cleft of the sock; a bandage of waxed thread holds the parts together, and the operation is complete. This is an economical method inasmuch as one seedling root always makes two and sometimes three grafts, the practice being to cut it into three or four inch lengths which are joined to the six-inch scions in the manner above indicated.

CROWN GRAFTING.

This method may be practised in the graft house during winter, or upon the stocks in nursery row. It is also a desirable way of top grafting, especially when working upon small trees. With large trees, the old, simple cleft graft method makes a better union. Crown grafting was fully described and figured in Bulletin No. 17 of the Experimental Farm. It may be described briefly as follows:—The scion is inserted in the crown or collar of the stock, at or a little below the surface of the ground. This may also be done in winter, using stocks which have been stored for the purpose; or early in spring upon stocks already established in nursery row by a season's growth. In outdoor work a strong growth is obtained the first year. The difference, however, between the crown graft and the ordinary root graft at the end of four or five years is less perceptible. This method presents special advantages to the amateur. In this locality, the best season for crown grafting out of doors is usually during the first half of April.

The scion is cut wedge shape, the stock with a slanting cleft is made in the stock for the reception of the scion, the scion is held in position by being firmly bound with waxed thread, and the joint is completed by a covering of grafting-wax to exclude the air.

In the case of out door work the process is essentially the same, except in the manner of tying. Instead of binding first, and waxing afterwards, a firmer joint is made by applying the wax first, and covering this with a cotton bandage which adheres to the wax, and holds the scion in position. It must be remembered in the case of stocks which are in the ground, that the whole top is cut off as soon as the scion is inserted, after a little practice this is easily removed by an upward cut, which can be made without disturbing the scion.

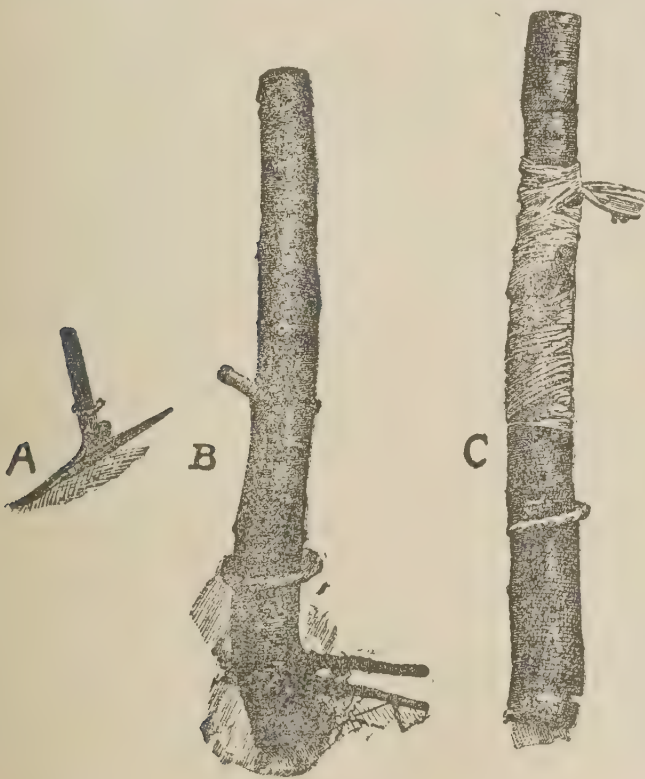
TOP GRAFTING.

This method of changing varieties or of multiplying certain kinds is more frequently adapted to the conditions and needs of the orchardist than the nurseryman. It is a common experience with orchardists to find after their trees come into bearing that it is

desirable to change the varieties. This may be brought about by top grafting. Every man who owns an orchard should be able, when it is necessary, to do this work. Where large trees are to be grafted, care should be taken in placing the scions so that the new top may develop symmetrically; nor should it all be removed the same season. The best plan is to take two or three years in making the change. In this way the injurious results arising from cutting off the whole top in one season is avoided. The best time to perform top grafting is in early spring. The work may be commenced three weeks before the appearance of leaves and carried on till they are full grown, or even later. Late grafting is usually unsatisfactory. The scions should be cut in the autumn and stored as previously described. The branches should be carefully sawed off and the roughened wood surface smoothly pared. The stub is then split by the use of a mallet and a heavy bladed knife. A wedge is used to keep the cleft open till the scions are inserted. These are prepared the same as in crown grafting. Two scions to each stub are used, one being placed at each extremity of the cleft. Care should be taken to place opposite each other in stock and scion, the two lines on the inner bark representing the points of growth. All the cut surface is then covered with grafting wax. Some growers wrap the joints with strips of cotton, which adhere readily to the warm wax. Trees so grafted usually produce specimen apples the third season, and are often very profitable for many years. As a method of introducing a desirable variety of apple into an orchard for the purpose of securing better cross-fertilization, top grafting is to be commended. It has also another feature of usefulness; by this means new and unknown varieties may be brought into bearing earlier than if allowed to fruit on their own stocks.

BUDDING.

This operation is performed in August upon stocks which have been set in nursery row the previous spring. The operation may be described as follows:—



With a sharp knife slice the bud smoothly from the adhering wood, by entering about half an inch above the bud, and coming out the same distance below, making the portion which is removed from the bud-stick an inch to an inch and a quarter in length. (See A). The bud is then ready for insertion beneath the bark of the stock. This is accomplished by making a perpendicular slit through the bark of the stock, about an inch in length, with the point of the knife blade and another with the blade of the knife across this cut at the upper end. The whole incision will thus represent the letter T. (See B.)

The bark at the corners of the incision is then raised with the blade of the knife, and the bud taken between the finger and thumb holding it by the leaf stem which serves as a handle, and is inserted into the cleft pressing it down until it is firmly placed beneath the bark. The operation is completed by binding the bud firmly in place by means of woollen or cotton yarn,

bass wood bark or raffia—a tying material much used by nurserymen. It is necessary to bind firmly and tightly in order to exclude rain and air as far as possible. (See C.)

In cases where the stocks are growing vigorously, it will be necessary to look them over two or three weeks after budding and loosen the bandages.

To obtain successful results from budding, the bark should be in a condition so that it can be easily raised from the wood; on the other hand, if there is too much sap beneath the bark, union will not take place and the bud as nurserymen say is “drowned ont.”

Buds set in August unite but remain perfectly dormant till the following spring. The stock is then cut off about half an inch above the bud. The whole strength of the stock thus being directed into this channel, the growth of the bud is very rapid; and in some cases it needs staking to prevent it being broken off, or bent by winds.

Buds are inserted also in the stems or branches of trees at the same time that stock budding is performed. It is often convenient to do this when other stocks are not available.

THE ORCHARD.

The Site.—The particular aspect of an orchard, especially in northern regions, has in recent years assumed a phase of considerable importance. The bark injuries so often noticed on the south and west sides of the trunks and main branches of trees have been pointed out by fruit growers to be most prevalent in orchards having warm southern exposures. As this injury, "Sun-scalding" as it is called, has generally been attributed to the effect of sudden cold in spring following upon the heels of abnormal heat, it is readily seen that the conditions offered by a southern slope are more favourable for injuries of this kind than those prevailing upon a northern incline. It is also true that a variety which is being grown towards the limit of its range northward is more likely to be injured in this way than one which is perfectly adapted to its environments. This leads me to say that as a general rule, other things being equal, a northern slope is preferable to a southern one; at the same time, it must be remembered that planting a tender tree on a northern slope will by no means make it hardy, although it may assist in prolonging life. Another important factor affecting the fruitfulness of apple orchards is what may be termed *air-drainage*. All observant farmers soon learn to look for the first effects of frost on certain portions of their farms. It will be noted that these parts are so situated as to allow the cold air to fall without disturbance. When these currents of moving air prevail, the liability of injury from spring frosts is much lessened. The effect of last spring's frost in many sections of the country was disastrous. Not only were entire crops destroyed, but curious malformations of the fruit which developed were apparent. Bartlett pears were received from half a dozen points in Ontario, exhibiting a heavy coat of russet covering half of the pear, including the calyx end. In other cases, the russetting was confined to a ring encircling the pear at or near its greatest diameter. In the Experimental Farm orchard, Wealthy was affected more than any other variety of apple. About twenty per cent of the apples which developed as a result were either deeply russetted (in some cases cracked) around the calyx, or had developed a growth of corky tissue in the same region. Many of the affected apples did not reach more than half their normal size, which materially added to the quantity of "culls" at harvesting. The russet patches on the pears were at first attributed to the effect of Bordeaux mixture, but as they were found on pears sprayed and unsprayed, but only in frosted sections, there is no doubt as to the real cause.

Preparation of Land.—It is a very bad policy and a very bad practice to plant the orchard first and prepare the land afterwards—as time admits. Time usually does not admit, and the result is that the young trees begin their orchard career badly handicapped.

When a person is seized with the idea of planting fruit trees, they are often so much carried away with it and are in such haste to put it into practice as to forget in this, as in many other instances, that thorough preparation is half the battle.

Such cultivation previous to planting as will bring the soil into a mellow friable condition is extremely desirable. If the surface soil is shallow and the sub-soil stiff and impervious, the use of a sub-soil plough is to be recommended. The idea of sub-soiling is not to turn a furrow of extraordinary depth, but to loosen the lower stratum of soil, by following the furrow of the ordinary plough with the sub-soiler, which stirs it up five or six inches deeper without turning it over. The effect of this aerating process is beneficial to the plant, and assists in securing from the soil the fullest amount of nutrition.

With regard to the kind of soil suitable for an apple orchard, it may be well to state that this fruit will accommodate itself to a great variety of soils, provided that adequate cultivation—meaning thorough drainage and sufficient manuring—be given.

Many orchards succeed in maintaining an unhappy and unprofitable existence on undrained soils, but their stunted and moss grown appearance tells the story of uncongenial surroundings. It will always pay to prepare the orchard area by thorough drainage and by supplying it with an abundance of plant food. A clover sod ploughed under followed by a hoed crop, such as potatoes, roots or corn, will leave the ground in good condition to receive the young trees the following spring. The advice is occasionally given to plant the trees first in order to save time, and bring the land into condition afterwards by good cultivation, but this must be regarded as dangerous counsel in the majority of cases.

TIME OF PLANTING.

Opinions are divided upon this question, some advocate spring, while others are in favour of autumn. My own preference is strongly in favour of spring as the most suitable season. This opinion is also borne out by experience in all the colder sections. In the vicinity of Ottawa fall planting is usually unsuccessful, and nearly always, even with the hardiest varieties, results in winter killing to a considerable extent. It is probable that trees are also injured by the drying out which must of necessity take place during winter when the tops are fully exposed to varying temperatures and the roots are as yet unconnected with the soil. Among the advantages of fall planting which may be noted, are that it is done at a season of greater leisure with the farmer than the spring, the work of planting may, therefore, be accomplished with greater care. It is also a fact that apple and other trees may be planted sufficiently early in the autumn to allow of some root growth taking place, so that the tree may in a measure become established. When this can be done with trees which have thoroughly ripened their wood, fall planting obviously has the advantage, especially in the milder portions of the country. It frequently happens, however, that nurserymen, in order to overtake their work, are obliged to dig their stock while the leaves are yet green, which does not allow of the autumn ripening process to take place as fully as is desirable, and consequently the chances of failure in fall planting with such trees are multiplied. All things considered therefore, the safest plan to follow, is to purchase the stock in the autumn, trim the roots and tops, and "heel in" for spring planting. All bruised root ends should be smoothly cut off with a sharp knife, which is a much better instrument for this purpose than pruning shears. The cut should be made in a slanting direction outwards. To "heel in" means to set the trees in a trench at such an angle that their tops will nearly, if not quite, rest upon the ground. Not only the roots but part of the stems should be covered with soil. A generous amount of protecting material should be laid over them again after frost comes for their better protection. Care should be exercised in selecting a place in which to winter them. The soil should be dry and mellow, and in a location which will not encourage the visits of such destructive rodents as mice or rabbits. I would say, therefore, purchase the trees in the fall, stipulating that the wood shall be well ripened, "heel in" and plant in well prepared ground in spring.

DISTANCE APART AND HOW TO PLANT.

The first consideration which arises is the distance apart at which the trees should be set. It is safe to say that the trees in nine-tenths of the orchards over thirty years of age in the province of Quebec and in Eastern Ontario are found at the present time to be crowding each other, and as a consequence are suffering individual injury. Now that the practice of spraying has come to be recognized as an annual necessity, trees ought, therefore, to be planted sufficiently far apart to allow of the convenient passage of cultivating implements and of spraying outfits. Then again, the distance should in a measure be governed by the locality and by the varieties planted. Thus, in districts where a temperature of 30 degrees below zero Fahr. is expected and where severe cold is continuous throughout winter, only the hardiest varieties are suitable. The hardiest varieties of which Duchess, Tetofsky and Whitney are types, do not attain the size of such kinds as Golden Russet, King, and Spy. While 30 feet apart each way is too close for trees of the latter type it is quite far enough apart for the former, so that the question of distance apart must be a matter for the consideration of the planter, who should be guided, to a certain extent by locality and by variety.

Whether the trees shall be planted in squares, rectangles or triangles is a matter of individual preference. When planted in squares they offer better facilities for complete cultivation, than if either of the other systems is employed. The principal point in favour of the latter two is that more trees can be planted to the acre. Some orchardists, more particularly those in the Western States, are advocating placing the rows twice the distance apart one way that they are the other. For instance, if planted 18 x 36 feet apart:—The trees are planted 18 feet apart in the north and south rows, thus allowing a distance of 36 feet between each tree in the rows running east and west. The disadvantages of this plan are that cultivating and spraying will be in a few years have to be done in the wider openings only. This will naturally militate against the thoroughness of the work. Of course by removing every alternate tree in the 18 feet rows, they can all be brought equal distances apart. The rectangular and quincunx forms allow of one-eighth more trees being set on a given area than if they are simply planted in squares.

Laying out and planting.—Crooked lines of trees in the orchard are very objectionable, and such care should be exercised as will ensure straight lines and right angles. A good way is to measure the opposite boundaries, placing tall stakes at the proper distances of the proposed rows. Several sighting stakes are then set in the lines of the rows between these boundaries. The holes for the trees may then be found by measurement—by using a tape-line or chain; or by marking the correct intervals upon a stout garden-line—one that will not stretch. In lieu of the line, galvanized wire may be used. Sighting posts set in the line of the rows, both ways, are very desirable and convenient while planting the trees. The work of digging the holes may be lightened by opening deep furrows in the lines of the rows; where the ground is in good state of tilth this is hardly necessary. The holes should be dug some inches deeper than it is desired to plant the trees, the subsoil well softened with a spade, and enough surface soil thrown in to leave the tree when planted a couple of inches deeper than it stood in the nursery row. Trees should be planted deeper in light sandy soils than in heavier clay or clay loam. Place the tree in the hole so that its roots will follow their natural bent, and see that it is sufficiently large to admit them without crowding. In filling the hole, fine earth should be carefully sifted and worked in among the roots, with a view of having all the roots in close contact with the soil, thereby obviating the possibility of leaving air spaces beneath the crown. The soil should be well tramped in when the hole has been half-filled, and this firming should be continued till it is level with the surface. It is advisable, especially in clay soils, to leave the last couple of inches unpacked and loosely laid on, as in this condition the evaporation of the soil's moisture is largely prevented. It is a mistake to plant trees in soil which is wet and sticky. It is also a mistake to water the roots when planting in soil of this character, as the tendency is for it to harden and become inhospitable alike to the advance of the growing rootlet, and impervious to the action of rain.

Trimming the Trees.—The advisability of trimming the roots before planting has already been mentioned. It is equally essential to success that the tops should be pruned to balance the amount of root branches removed in the process of digging the trees. In connection with this operation the shaping of the future head should be kept in mind, and only the requisite number of leading branches allowed to remain. The ideal shape, is a central ascending leader with side branches disposed at intervals. This ideal, however, is rarely secured in fruit trees. Each variety has its own habit of growth and the pruning must therefore conform to natural characteristics. It is a safe rule to shorten the length of the last annual growth one-third or one-half, taking care to cut back to a bud which should be on the outside in the case of a pyramidal grower and on the inside when we are dealing with a variety of spreading habit. By pruning the top and by firmly packing the earth about the roots the necessity of staking is usually obviated.

What kind of Trees to Buy.—Much discouragement and many failures result from buying large trees. The belief that large trees can be transplanted as successfully as small ones, and that they will bring forth fruit sooner is a mistaken one frequently resulting in serious loss to the planter. Not only are they more difficult to pack and

ship but also much more difficult to transplant successfully. Strong two-year old trees from the bud or graft are in most instances the best trees to select, but well grown three year olds are equally desirable. In the colder sections moderately low heads are preferable to tall standards. The low headed tree frequently escapes injury from sun-scalding when the tree with 6 or 7 feet of bare stem suffers severely. A good rule in buying trees is to purchase from the nearest reliable nurseryman having soil and climatic conditions similar to those found in the locality in which it is to be planted. The question is often asked are southern grown nursery trees suitable for planting in the north. In answer, it is safe to say the hardiness is not lessened by being propagated in the south, if the wood is well matured before digging; in other words, the constitution or individuality of the tree is more or less fixed and constant, and will not be changed much in the life time of a single individual, therefore very little in the two or three years necessary to produce a suitable nursery tree. Given a thrifty tree of the Duchess variety with its wood well ripened, its hardiness would be little affected by being grown either in the Niagara Peninsula or at Ottawa. When the trees are grown in the south and have been dug before thorough maturation of the wood has taken place, of course the injury following a removal to a colder climate will be intensified. Planters will save money by purchasing *good stock* as near home as possible. A stunted nursery tree cannot be expected to make a strong tree in orchard. Buy "number one" trees; they are the cheapest in the long run.

Mulching may occasionally be practised with advantage, but it is not generally to be commended. As a general rule, the best mulch consists of two or three inches of mellow surface earth, which prevents evaporation quite as effectively as twice the amount of strawy manure, sawdust or other litter. Mulching has also the tendency, if practised year after year, to encourage the growth of surface roots, to the detriment of the lower system of roots. These upper roots are, on account of their position, sometimes injured by severe frosts coming in advance of snow in early winter.

Care of the Orchard.—The orchard should be cultivated continuously at least six or eight years after planting the trees. The practice of sowing grain in the young orchard is an injurious one. All cereals draw heavily upon the moisture of the soil at the same time as the trees are making their annual growth, and consequently act as a serious check upon the latter. When apple trees are planted, they should be regarded as the crop, and they alone ought to have possession of the soil which they occupy. When, owing to pressure of circumstances, it is found necessary to grow grain crops in the orchard—as has been the case at the Central Farm—strips, five or six feet wide, should be left on each side of the tree-rows for the passage of the cultivator. This is a good plan to follow at all times without reference to the crop cultivated, whether it be roots or cereals. The best crop is one which needs cultivation during the early part of the season, and is removed about the middle of July or the first of August. Early potatoes will be found to fill these requirements, but other hoed crops, such as corn, beans or early vegetables, may also be grown satisfactorily. Clean culture is at all times desirable and will always pay. Weeds and rubbish attract and afford shelter for mice and insects. Cultivation should be clean and thorough each year, but should not be continued throughout the summer. In this vicinity, the annual growth takes place previous to July first. After that period, the function of the leaves is to elaborate the nourishment drawn from the soil and the air. This material is stored in the buds and young wood tissue, and the process goes on to, or approaching the period of the fall of the leaves. Everything that the cultivator can do to facilitate this process should be done. Cultivation of the soil tends to render available, for the use of plants, the food stored up in it. This is why stirring the soil frequently, so materially assists the growth of such plants as corn and cabbage. Cultivation, therefore, promotes and encourages growth. In order for trees in cold climates to successfully withstand the frost, the wood must be in a well-ripened condition, that is, the liquids or partial liquids must have changed to solids, such as starch and its allied forms, in order to assist growth the following spring. The best rule, therefore, is to cease cultivating about the middle of July or the first of August. If the orchard is then seeded with Mammoth clover, Lucerne or some other legume, a fair growth will be obtained the same season, which

will act as a cover to the soil in addition to keeping down weeds. This may be ploughed under early the following spring. Buckwheat is occasionally sown, but is rather objectionable on account of the seed resting in the ground. After six or seven years of cultivation it may be found convenient, and it is also a good plan, to seed down to clover. Some pear growers follow the practice of allowing the clover to lie on the ground after cutting it. This acts as a manurial mulch and saves to the soil all the extracted plant food in addition to the nitrogen collected by the clover roots (see chapters on soil in the Chemist's report for 1893-4-5). The practice which many farmers follow of taking a crop of hay from the orchard land each year is not a good one, and should not be encouraged. In every instance, as before stated, it should be remembered that the trees are a sufficient crop and that any other crop that may be grown should be especially provided for by extra manuring. Manuring and cultivation will always pay. Early mistakes in the management of an orchard are not easily remedied.

Pasturing the Orchard.—I have seen orchards situated on side hills or upon rocky ground, such as could not well be cultivated, kept in good condition by pasturing with sheep. If the sheep are supplied with water and allowed a half pound of meal each per day they are not likely to molest the trees. On the contrary if the trees are headed low, the grass scanty and dry, they will certainly browse the lower branches and attack the bark of the younger trees. If the habit is once acquired it does not readily leave them. The advantages of sheep pasturing the orchard over keeping it in meadow are obvious. The fertility of the soil is strengthened rather than depleted, the wormy apples are effectually disposed of; noxious weeds are kept down in addition to the suckers which occasionally rise from the roots of budded trees. Pasturing the orchard with sheep possesses many advantages over keeping it in meadow or allowing it to care for itself in company with a crop of grass and weeds.

Manures.—The reader has already been referred to the report of the Chemist for information on soil, and I would again refer him to the same authority for reliable data regarding the use of manures in the apple orchard (see page 168, report 1894). Mr. Shutt's investigations show that of the principal elements of soil fertility, potash is drawn upon most heavily by the apple tree in the production of foliage and fruit. Among the natural fertilizers furnishing potash in a cheap form wood ashes undoubtedly takes first place. The chief value of these lies in the potash which they contain. The potash being in a readily soluble form and care should be taken to keep the ashes under cover and away from the leaching effect of rain. The soluble character of the most important fertilizing constituent in wood ashes gives a hint as to the best time and way to apply them, as well as other fertilizers equally soluble, viz., at that period when the plant is in a growing condition, therefore prepared to take up plant food. Bone meal is one of the commonest and easiest procured forms in which phosphoric acid may be secured. In barn-yard manure the third important fertilizing constituent, nitrogen, is to be found in excess of the two already mentioned. In soils which contain naturally a large amount of vegetable matter there is danger of applying barn-yard manure freely. On such soils better results may be looked for if wood ashes and lime are applied alternately. Thirty or forty loads of barn-yard manure every third year would likely give a sufficient quantity of nitrogen. Wood ashes can be advantageously applied at the rate of 50 to 75 bushels per acre. Bone meal may be used at the rate of 150 to 200 lbs. with good results. No general rule can be safely laid down in the matter of manuring owing to the varying character of soils. What might be good treatment to one might be wasteful expenditure in another. Each grower should study his trees. If they are making plenty of growth each year the nitrogenous element is probably present in sufficient quantity. If they are bearing well or if it is the desire to encourage the production of fruit, the phosphates and potash should be applied with the exercise of care and judgment.

Pruning.—The primary objects of pruning a tree are to so shape the heads as to bring it to maturity, strong, symmetrical and well balanced—to prevent the formation of matted and bushy tops made up of interlacing branches—to encourage the production of fruit of good quality. Fruit borne on the inner branches of a bushy topped tree is neither as handsome in appearance nor as good in quality as that grown on better developed branches supplied with plenty of sunlight.

When to Prune.—One of the greatest mistakes made by a fruit grower is to allow orchard trees to follow the bent of their own inclination for some years and then suddenly to arrive at the conclusion that he must make a "job" of pruning them. This sometimes means that the trees are attacked with a saw, or still worse, an axe. The mutilation that usually follows is almost certain to act injuriously on the health of the tree. A certain amount of pruning should be done each year after the tree is set in the orchard. The wounds made by cutting away the small branches soon heal over and the tree does not receive the shock consequent upon removing a large portion of the top at one time.

The time to prune seems to me to be at that period when the wound made will be repaired by nature with least delay. This is at the beginning of the growing season, in this vicinity from May 15th to June 15th. As this is usually a busy season the work may be done before sap starts in the spring. Heavy pruning can usually be most advantageously done at this time.

How to Prune.—Use a sharp knife and a fine toothed saw. Pruners nearly always leave bruised twig ends. They are convenient in pruning tall trees, for shortening lateral branches, cutting scions, or work of this kind, but are not equal to the knife for convenience or effectiveness. Always cut close up to the base in removing a branch. Long stubs die back gradually and carry decay to the body of the tree. All wounds over an inch in diameter made by the removal of branches should immediately be covered with mineral paint or grafting wax. When heavy pruning has taken place during winter a considerable amount of summer pruning the same year will as a natural consequence follow, owing to the number of shoots thrown out near the base of each branch removed. These, if taken in time early in June, may be removed without the use of a knife by merely running the hand quickly over the branches. Sometimes the fruitfulness of trees may be increased by summer pruning. This consists in shortening by pinching in, the growing twigs during the month of June. The theory is that in thus checking wood formation, the production of fruit buds is encouraged.

CARE OF THE FRUIT.

Thinning.—There production of its kind in the case of the apple, as in other plants is the primary object of its existence. This is accomplished in nature by means of the seeds. Man has largely increased the relative amount of pulp which surrounds these to serve his own ends. It is the production of seeds which makes the heaviest drain upon the vitality and vigour of the tree. Some varieties, if allowed to follow their natural bent, will produce more apples year after year than the health of the tree can withstand. This, if allowed to go on, will result in a weak growth and the production of undersized fruit. It is therefore incumbent upon the owner of such trees to reduce the amount of apples early in the season to such a quantity as may in his judgment be perfectly developed without weakening the tree. This may mean removing as much as one-third or even one-half of the crop which has set. The work of thinning is often overlooked, but its importance should not be forgotten. The best time to do it is soon after the fruit has set, and the prospective crop seems fairly well assured. It is work that must of necessity be done by hand, but it may be carried on in conjunction with light pruning at that season of the year. If thinning is perseveringly practised each year, it will have a tendency to bring about annual crops instead of heavy crops on alternate years.

Picking.—The keeping qualities of many varieties are seriously impaired by allowing them to hang on the trees too long. Especially is this true of the summer and autumn varieties. As a general rule, all varieties should be gathered when the apple readily separates on turning it upwards from the spur to which it is attached. Picking as soon as the seeds have coloured, is also a more or less correct rule generally considered. Early maturing varieties like Tetofsky, Yellow Transparent and Red Astrachan, need particularly careful and expeditious handling, as their period of edible maturity is of short duration. These white skinned varieties readily show bruises, and in picking them the greatest care should be exercised. Pickers frequently show but slight discrimination in the methods of handling apples and potatoes, much to the detriment of

the former. Shaking apples from the tree, carrying them away from the orchard to the market in bags, are customs that belong to the old days of cider making, and applied to products whose quality was not affected appreciably by bruises or codling worm. The fruit-grower of to-day must exercise every possible precaution and devices in order to place his products upon the market in the best condition, as well as the most attractive form. It is a good plan in marketing apples like Duchess and Yellow Transparent, not to remove all the fruit at one picking, but to go over the trees two or three times, each time taking the largest and best coloured specimens. This method is one to be commended, inasmuch as it allows of a greater proportion of the fruit reaching perfect maturity than would be otherwise obtained. In the case of winter apples the methods are inapplicable and unnecessary, the whole crop being allowed to hang on the tree and harvested at the same time. The keeping season of Wealthy apples may be considerably extended by picking rather early in the season.

Picking Receptacles.—For ordinary use a strong splint basket with swinging handle is most satisfactory and serviceable. It allows of the apples being deposited upon the grading table or into barrels without injury. It also lends itself to a variety of circumstances with advantage. Among other devices for picking which I have found of great service is a modification of a strong grain sack. This is prepared by sewing in the mouth of the sack a strong barrel hoop; then attach a strap, provided with a snap at the free end, to one of the lower corners of the bag. A ring is fixed to the hoop to which the snap is attached, when the bag is ready for use. When used it is suspended by means of the strap from the picker's shoulder after the manner of sowing grain by hand. This allows of the use of both hands and also permits of the bag being emptied with ease into a barrel when conveniently filled, by merely detaching the snap. In picking the early apples, on account of their tenderness, it is occasionally possible and desirable to pick directly into the barrel in which they are marketed. This is usually impracticable, however, as the grading cannot be done satisfactorily when the fruit is being picked.

Packing and Packages.—A prime requisite towards attaining ultimate success in marketing orchard products is that the layer of fruit shown on the top layer or upper specimens should be thoroughly and exactly representative of the quality of each package, whether this be basket, box or barrel. This is *honest packing*, and when carried into practice, having with it the packer's brand and name, with the name of the variety, will soon win for itself a favourable reputation in the market, to which it is consigned. The question of honest packing receives every year at the meetings of the different fruit growers' organizations of the Dominion, a good deal of consideration, but owing to the system in vogue, of selling to the dealer, and the difficulty of inspecting the stock when packed, the whole matter is yet in an undesirable and unsatisfactory condition. It is hoped that such a system of inspection will be devised and carried into operation as will result in guaranteeing that the quality of each barrel of apples shall be exactly represented by the brand and grade, which appears upon the end of the barrel—with regard to the kind of package. Soft and early apples should be put up in small packages. I would recommend the use of 10 and 20 lb. baskets as well as bushel boxes for marketing the finer grades of summer and autumn apples.

Grading.—In packing apples it is always desirable to make at least three grades. The first should consist of sound well-coloured specimens without blemish, uniformly of good size; the second grade should consist of sound specimens, smaller in size, less handsomely coloured, and possibly with slight blemishes. The third grade should consist of the small wormy, spotted or ill-formed specimens which could not properly be included in either of the preceding grades. This work is done more advantageously in the packing house than in the orchard. These houses are provided with sorting tables covered with carpeting or matting to prevent injury to the apples. The sorting tables, being provided with shallow sides and being inclined towards the sorter, who, stands at one end, offer a convenient method of rapidly separating the fruit into the three grades as above outlined. The first and second grades should be carefully placed by hand into separate baskets, while the third and remaining grade may be swept into a receptacle at the end of

the table. In packing or filling barrels, the end which is to be opened is placed downwards. It should be lined with a sheet of paper. On this a row of apples is placed with stems turned down. If another layer is ranged over this, so much the better. This is called "facing" the barrel and is an important part of the packing of a barrel of apples, inasmuch as the layer exposed to view after the head is removed should fairly represent the contents of the barrel throughout. The remainder of the barrel is filled by gently emptying into it the baskets as filled on the grading table. During this process the apples should be settled down firmly by cautiously shaking the barrel once or twice. The last layer of apples should come slightly above the heading groove, so that when pressed down every apple is held firmly in place, but without being crushed. There is a move being made towards the introduction of a smaller package for winter apples than the barrel. This is a wooden box holding about a bushel of apples, neatly made of light and strong wood. These boxes are more easily handled than barrels, take up less space on board ship and may be "headed" without bruising the fruit. They also admit of the grower's name, with grade and name of fruit being neatly printed upon the end. While to the writer this box appears to be a most desirable kind of package for the English and other foreign markets, yet the reports of commission merchants received this autumn discourage their use. These reports may be coloured by the lack of desire on the part of the Liverpool commission houses to introduce innovations which call for changes in their present methods of doing business. It is my opinion that there is a future for this kind of package.

For marketing early varieties of apples, strong, leno covered baskets holding about 20 pounds of fruit, are undoubtedly the most suitable and profitable packages. This class of apples is bought in small quantities from the retailer and also requires quick handling. There is each year much loss resulting from the use of barrels in transporting early apples which might be greatly reduced by the use of smaller packages.

Storing — Apples will keep best in a moderately damp atmosphere with the temperature slightly above the freezing point. It should always be remembered, more particularly in connection with winter apples, which are frequently barrelled in the orchard and then hauled to the storing room in large quantities, that a sudden change of temperature will cause a condensation of moisture upon the surface of the apple. This nearly always follows the deposition of the apples in the cool storing cellar. Wet surfaces present favourable conditions for the development of fungi causing decay. These extremes of temperature may be avoided by allowing the apples to remain in unheaded barrels in the orchard packing shed over night and hauling them to the cool cellar—which has also been open to the cooling influence of night air—in the morning, when the doors and windows should be closed. In this way, aided by early harvesting, the season of autumn apples like Wealthy and Longfield may be much extended.

VARIETIES TO PLANT.

Upon this question it is impossible to give definite lists. One of the first things to do is to study the conditions surrounding the proposed orchard site; then find out what varieties have succeeded best in the immediate neighbourhood. If there is no data available on the latter question, it is advisable to plant a limited number of the most generally approved sorts and watch their behaviour before extending the plantation. It may be also pointed out here that this division of the Experimental Farm is always pleased to aid the farmer with such information as may have been acquired with regard to the most suitable varieties for planting in whatever locality the applicant may reside. The grower living in Quebec is also recommended to consult the Experimental Farms Report for 1893, in which lists are given of varieties of fruits adapted to the various fruit districts of this province. If residing in Ontario, he cannot do better than consult the Report of the Provincial Fruit Growers' Association, in which information similar in character is found.

ENEMIES.

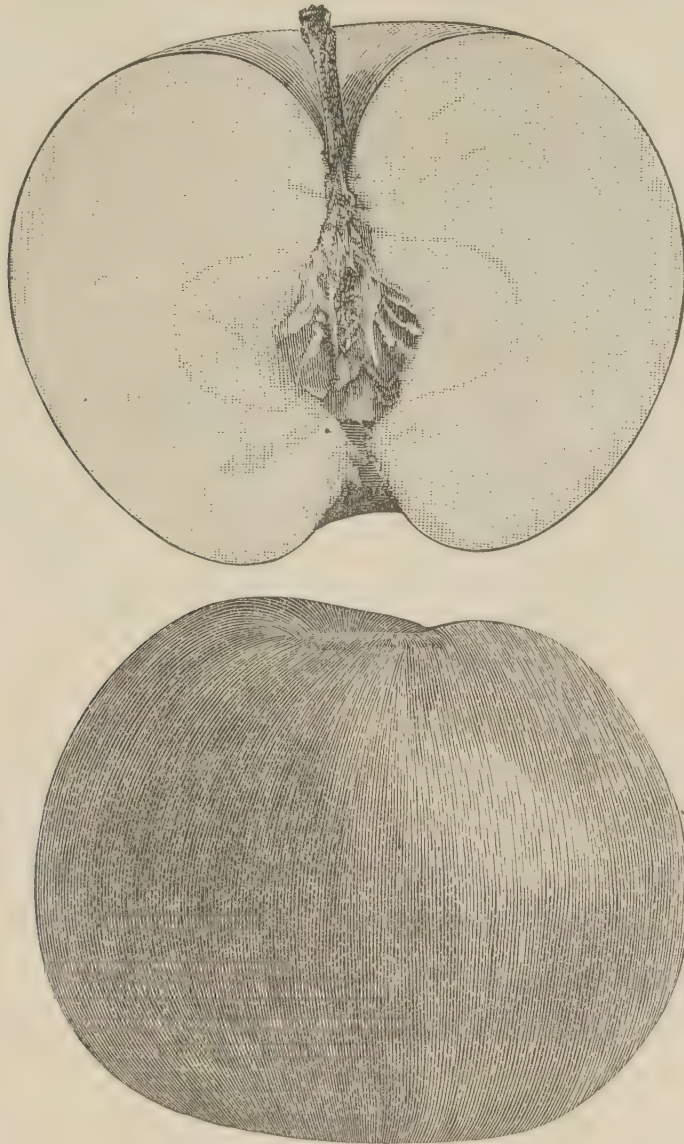
These have been fully treated in special bulletins issued from time to time by the Entomological and Horticultural Divisions, which are available to all who may apply for them. Special reference may be drawn to Bulletin No. 23, which contains in concise form instructions for the treatment of injurious diseases as well as insect pests.

To sum up this matter briefly, the principal fungous diseases and insect foes attacking the apple may be kept in check by the timely application of Bordeaux mixture and Paris green. These are diluted with water and applied to the trees in the form of a spray. A good formula to use is 4 pounds each of copper sulphate and lime, 4 ounces of Paris green diluted with 40 to 50 gallons of water. The mixture should at least be applied three times each season ; once before the flower buds open, again after blossoms fall, and a third time two or three weeks later. Special cases may call for additional treatment ; it will at any rate fully repay every grower of apples to set down this much at least on his yearly programme of cultural operations. The main features governing successful apple growing may be summarized as follows :—

1. Select a favourable soil, drain and prepare it thoroughly.
2. Buy good trees, plant with care, prune and cultivate adequately and with judgment.
3. Pick the fruit carefully in season, pack it honestly, using suitable packages, market it judiciously.
4. Protect the tree from enemies by spraying, and keep it in health by manuring.
5. Always remember that the land occupied by the trees is for them alone, and should not with impunity and without compensation be robbed of its fertility by growing upon it other crops.

HARDY APPLES OF MERIT.

Scott's Winter.—Introduced by Dr. T. H. Hoskins, of Newport, Vermont. It has already been widely planted and the object of mentioning it here, is not so much to recommend it unqualifiedly, as to draw attention to some points to be borne in mind in connection with its cultivation.

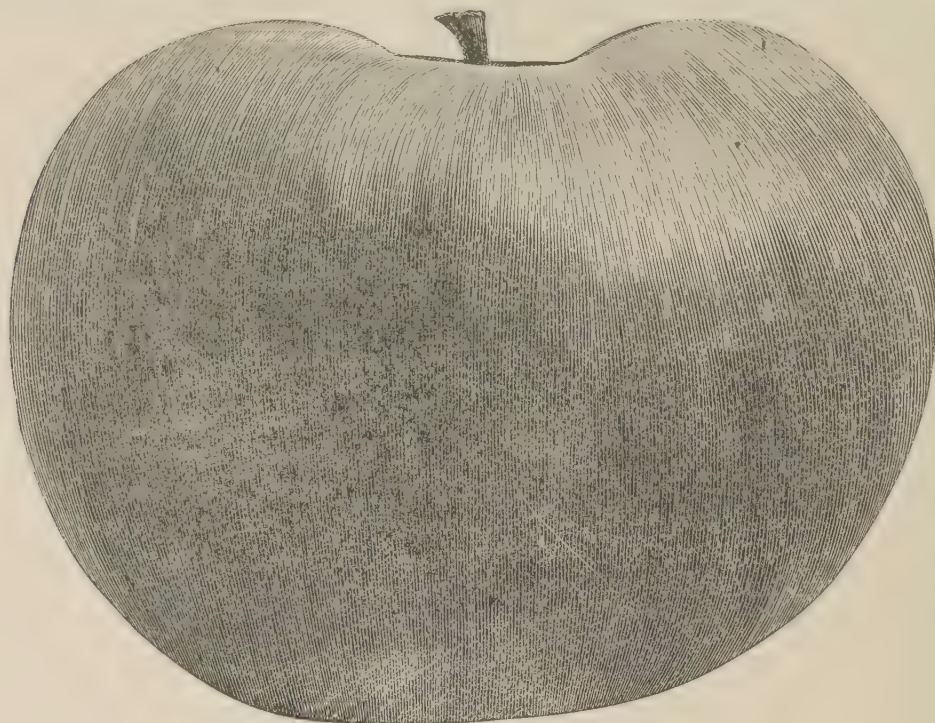


SCOTT'S WINTER.

In the first place this is an apple belonging essentially to the same class as Gideon and McMahan, in regard to the locality in which it should be cultivated. Secondly, it should not be grown in sod or without high manuring and clean cultivation, on account of the size of fruit, which is naturally small, and without good treatment becomes unprofitably so. At Grenville, P.Q., Mr. Robert Hamilton reports it "not quite hardy." At other points in Quebec, as well as Ottawa, there has been no complaint along this line. The fruit when well grown is of medium size and handsomely striped and splashed with dark red. It does not reach good eating condition until after mid-winter when its sharp acidity becomes less pronounced. As a keeping apple it certainly excels, being in its best condition from February till May. Its principal value is for culinary purposes.

McMahan White.—Introduced by A. L. Hatch, Ithaca, Wis., U.S. This variety has already been noted in the report of this division of the Central Experimental Farm, but attention is again drawn to some of its merits as an apple of value for regions where Northern Spy, Ribston Pippin and Rhode Island Greening cannot be grown profitably on account of their inability to withstand the severity of the climate. It has proved so

far a remarkably vigorous and healthy grower, making probably more well matured wood growth than any other variety in the orchard, and is free from many of the defects characteristic to varieties unadapted to this climate. It has borne moderately heavy crops for the past two years. The fruit is of the largest size, smooth and handsome, though lacking in colour as grown in this vicinity and somewhat soft in texture.



McMAHAN WHITE.

Description.—Fruit, large to very large, round, regular. Skin, green or waxy yellow with a delicate pink blush. Cavity, deep, narrow and lined with dark russetting. Stem, short, swollen at base. Basin of medium depth, slightly wrinkled. Flesh, white, rather coarse, crisp, juicy. Quality, fair. Season, November to January.

FRUIT GROWING ON THE LOWER ST. LAWRENCE.

The Island of Orleans, the counties of L'Islet and Kamouraska in Quebec, have long been noted for their production of fine plums and cherries. These and other fruits were brought out by the early colonists from France, and have up to the present time been mainly reproduced from seed. In this way and by the workings of the law of *natural selection*, a race of plums and cherries, is now growing in that rigorous climate, which annually yield heavy crops of good fruit, when kept free from black knot. It is interesting to note the dwarfing effect the climate has undoubtedly exercised upon the form and habit of these trees. In old orchards, trees of blue and yellow Orleans plums, may be seen, with the lower branches resting upon the ground, the diameter of the tree being 15 to 20 feet, while its height would not exceed 10 feet. The heavy snow fall and equable temperature furnish conditions favourable to the longevity of these trees. The following interesting report presented by Mr. J. C. Chapais, Assistant Dairy Commissioner, gives valuable information to intending planters in lower Quebec.

A NORTHERN ORCHARD.

Owner—J. C. Chapais.

Locality—St. Denis, county of Kamouraska, province of Quebec, Canada.

Lowest temperature—30° below zero Fahrenheit, experienced only twice in thirty-two years.

Highest temperature—94° Fahrenheit.

Rainfall—Average for 17 years, 29 inches per year

Snow—Average, three feet deep in open country.

Exposure—Ground gently sloping to the north.

Predominant wind—North-eastern damp wind, with salt emanations coming from the Gulf of St. Lawrence.

Soil—Sandy clay, well drained.

Trees planted.	When planted.	Growth and condition.	Season.	Giving fruit.	Number for reference.
<i>Apples.</i>					
Alexander	1891	Very good....	Late fall.....	Yes....	1
Antonovka.....	1889	do	do	do	2
Arabka (Ell B.).....	1889	do	Late winter.....	do	3
do (summer).....	1889	do	Early fall.....	do	4
Astrachan Red.....	1889	do	Late summer.....	do	5
Bubushkino (grandmother)....	1889	do	Late winter.....	do	6
Blushed Calville.	1892	do	Early winter.....	No....	7
Bode.....	1892	Good.....	.....	do	8
Charlottenthaler	1889	do	Early summer....	Yes....	9
Duchess.....	1889	Very good....	Early fall.....	do	10
Fameuse.....	1889	do	Early winter.....	do	11
General Grant	1884	do	Summer crab....	No....	12
Gipsy Girl.....	1892	Good.....	Fall.....	do	13
Golden Russet (English).....	1891	Very good....	Late winter.....	Yes....	14
Golden White.....	1891	Good.....	Fall.....	No....	15
Grand Duke Constantine	1889	do	do	do ..	16
Hare Pipka.....	1892	do	Early winter.....	do	17
Hyslop.....	1889	Very good....	Early fall crab....	Yes....	18
Longfield.....	1889	do	Late winter.....	do	19
Louis Favourite.	1891	do	Early winter crab.	do	20
McIntosh Red.....	1891	do	Early winter.....	do	21
Orel, No. 1.....	1894	do ....	.....	No....	22
Peach.....	1891	do	Late summer.....	Yes....	23
Princess Louise	1891	Good.....	Early winter.....	No....	24
Red Beitigheimer	1894	Very good....	Early fall.....	do	25
Red Queen.....	1893	do	Winter.....	do	26
St. Lawrence.....	1889	Good.....	Late fall.....	Yes....	27
Titovka.....	1889	do	do	do	28
Transcendant.....	1889	Very good....	Early fall crab....	do	29
Wealthy.....	1889	do	Early winter.....	do	30
Whitney.	1891	do	Late summer crab.	do	31
Winter St. Lawrence.....	1891	do	Early winter.....	No....	32
<i>Pears.</i>					
Baba.....	1892	Very good....	.....	No....	33
Bessemianka.....	1892	do ....	.....	do	34
Flemish Beauty.....	1895	Good.....	.....	do	35
<i>Apricot.</i>					
Alexander	1895	Good.....	.....	No....	36
<i>Plums.</i>					
Bradshaw	1889	Very good....	Middle of Sept'r..	Yes....	37
Coe's Golden Drop	1889	do	End of October ...	do	38
Damson.....	1889	do	Beginning of Sept'r	do	39
Damson Yellow.....	1889	do	do	do	40
Early Yellow	1889	do	End of August.....	do	41

NORTHERN ORCHARD—*Concluded.*

Trees planted.	When planted.	Growth and condition.	Season.	Giving fruit.	Number for reference.
<i>Plums—Con.</i>					
Imperial Gage.....	1889	Very good....	Beginning of Sept'r	Yes....	42
John Trotter.....	1892	Good.....	.....	No....	43
Lombard.....	1889	Very good....	End of September.	Yes....	44
Moore's Arctic.....	1891	Good.....	.....	No....	45
Orleans Blue and Yellow.....	1889	Very good....	Beginning of Sept'r	Yes....	46
Reine Claude.....	1889	do....	Middle of Sept'r..	do....	47
Shropshire Damson.....	1889	do....	End of October....	do....	48
Smith's Orleans.....	1889	do....	Middle of Sept'r..	do....	49
Trabische.....	1891	do....	do	do....	50
<i>Cherries.</i>					
Bessarabian.....	1892	Very good....	August.....	Yes....	51
Early Richmond.....	1889	do....	July.....	do....	52
Lutovka.....	1892	do....	August.....	do....	53
Montmorency.....	1889	do....	July.....	do....	54
Vladimir.....	1891	do....	August.....	do....	55
<i>Gooseberries.</i>					
Chatauqua.....	1895	Good.....	.....	No....	56
Downing.....	1889	Very good....	.....	Yes....	57
Houghton.....	1889	do....	.....	do....	58
Industry.....	1895	Good.....	.....	No....	59
Pearl.....	1891	Very good....	.....	Yes....	60
Red Jacket.....	1895	Good.....	.....	No....	61
Smith's Improved.....	1889	Very good....	.....	Yes....	62
Whitesmith.....	1895	Good.....	.....	No....	63
<i>Currants.</i>					
Black Naples.....	1889	Very good....	.....	Yes....	64
Fay's Prolific.....	1889	do....	.....	do....	65
Versaillaise.....	1889	do....	.....	do....	66
White Grape.....	1891	do....	.....	do....	67
<i>Raspberries.</i>					
Antwerp.....	1889	Very good....	.....	Yes....	68
Marlboro.....	1891	do....	.....	do....	69
Stone's Hardy (blackberry).....	1891	Weak.....	.....	do....	70
White Framboise Blanche.....	1889	Very good....	.....	do....	71
Japanese Wineberry.....	1895	Good.....	.....	do....	72
Lucretia Dewberry.....	1894	Weak.....	.....	No....	73
<i>Strawberries.</i>					
Sharpless.....	1887	Very good....	.....	Yes....	74
White Alpine.....	1889	do....	.....	do....	75

REMARKS.

Among apples, Nos. 1, 2, 3, 4, 5, 6, 9, 10, 11, 14, 18, 19, 20, 21, 23, 27, 28, 29, 30, 31 have fruited. The season is indicated for these after they have fruited, and shows a tendency for all fruits to be a little later in ripening in this latitude than in western Quebec and Ontario, Grand Duke Constantine and an unknown tree, though planted since 1889 and being thrifty have not yet fruited. Duchess, Fameuse and Wealthy, give as nice and large fruit as trees of these varieties grown at Montreal. Most of the other varieties give fruit a little smaller in size, with less colour than western fruits.

I planted an Alexander Russian apricot in 1891 and it has passed two winters very well, but in the spring after the second year it was killed by an application of a strong Bordeaux mixture. It was very healthy when thus killed.

Amongst plums, Damson, Early Yellow, Reine Claude de Montmorency, Shropshire Damson, Orleans blue and yellow, are plums grown here from very early times. We have in our locality trees of these varieties over fifty years old.

The Early Richmond Cherry is the same as the variety called French Cherry (*cerise de France*) and is the best and hardiest cherry known here. I doubt that the Russian cherries, newly imported, will do better or even as well. So is the White or Orange Raspberry (*framboise blanche*) which was imported with the Early Richmond from France, by the first settlers who brought them here with the White Alpine Strawberry. Our *cerise de France* is called Early Richmond and sometimes Kentish, because the authorities in fruit growing cannot discover much, if any, difference between them.

There is no doubt that the deep layer of snow which covers the ground during winter, in our section of the province affords much protection to our fruit trees. We never bend down our raspberries for protection in autumn.

Up to date we have no blight on our apple trees, nor mildew on our gooseberries. But black knot and apple scab are very common. We have had very good results with spraying with Bordeaux mixture and Paris green (except on apricots.)

I append here a few notes on another orchard situated in a still more northern and eastern position than ours, of which I have seen the fruits:—

LOCALITY,—Rimouski, county of Rimouski, province of Quebec.

LATITUDE,—47° 45'.

TEMPERATURE.—Same as St. Denis, but a little more damp.

SOIL.—Rich sandy loam, ground sheltered around the orchard by a wind break of poplars and spruces.

OWNER OF THE ORCHARD.—Mr. D. Bégin.

VARIETIES OF FRUIT GROWN.—Apples:—Duchess, Yellow Transparent and four varieties of Crabs. Fine plum trees of the Damsen, Early Yellow, Orleans and Reine Claude type are also grown in the same orchard, with success. Fruit is of first class quality.

J. C. CHAPAIS.

SEEDLING APPLES.

During the past season a large number of seedling apples and other fruits of greater or less merit have been received at this office. It is always gratifying to know that growers take sufficient interest in this work and realize the interest which this department takes in the introduction of new fruits to such an extent as to forward these new and unknown varieties for examination. Many of them, however, have not been of sufficient value to warrant a detailed description. They have in each case been acknowledged, and a brief record entered upon the books of this division. Among the most prominent apples received the following varieties are noted:—

From A. McD. Allen, Goderich, Ont.—

Breckenridge.—Description: In a general way this resembles Northern Spy; size medium to large; form, approaching oblong, ribbing very obscure, sometimes wanting; skin, yellowish green, thick and tough, partly covered with stripes and splashes of red. Stem slender. Cavity deep and broad. Calyx open; basin shallow, almost wanting. Flesh white, flaky, juicy, sub-acid with a distinct Northern Spy flavour; promising and worthy further trial. Mr. Allen says: "Grown by John Breckenridge here (Goderich) it is a great bearer, long keeper and towards spring is of excellent quality."

Jordan.—Russet type ; medium size, by measurement eight and three-quarter inches in circumference, by two and a half in length ; form regular, roundish oval. Skin, greenish yellow, thinly covered with light russet, which is laid on in patches varying in density and sparsely sprinkled with gray dots. Stem three-quarters of an inch long, moderately stout. Cavity varies from broad and shallow to deep narrow and lipped. Calyx prominent and closed, occasionally open however, with broad segments. Basin shallow, smooth. Flesh a greenish yellow, fine grained, breaking, moderately juicy, mild sub-acid, rich, pleasant and of good quality. Season, late winter. This variety is also worthy of attention. Mr. Allen says that this is grown by F. Jordan, of Goderich, that it is a long keeper and of fine quality when ripe. Further, that it will easily keep till June.

From Franklin Crandell, Lindsay, Ont.

Empress—Seedling Apple.—Mr. Crandell says that the tree appeared on the spot where a Baldwin was once growing. "It is now fifteen years old, has been in bearing 10 years, bears every year. In 1894 the crop was 3 barrels ; in 1895 it was 7 barrels. It is a free grower and extremely hardy. Description:—Fruit above medium size, varying from ten to eleven inches in circumference. Form oblate, flattened at both ends. Skin greenish yellow, with a solid carmine blush where exposed, splashed with deeper shade and thickly sprinkled with minute, dark brown specks margined with green. Stalk very short and stout. Cavity broad of moderate depth, slightly russeted around the base of the stalk, outline irregular with a slight lip. Calyx open, segments broad and short. Basin broad and deep, not wrinkled but somewhat irregular and precipitate. Flesh nearly white, almost fine in grain, mild sub-acid, juicy, pleasant flavour, quality very good. Core small.

From John Miller, Markham, Ont.

Seedling Apple.—Mr. Miller says the tree is 40 years old and was growing on the farm when he came in possession of it 28 years ago. It is healthy, and a regular bearer. Description:—Medium size ; form roundish oblate. Skin smooth, yellowish, red on one side, and splashed all over with bright red. Stem very short, moderately thick. Cavity deep, narrow, smooth, lightly russeted. Calyx closed, segments broad and short. Basin shallow and uneven. Flesh, greenish white, fine grain, juicy, mild sub-acid, in flavour and good in quality. Core of medium size, seed very plump. Season, December to January. An attractive apple, no better in quality perhaps than others of the season now in cultivation, but yet one which may prove valuable in some sections on account of the hardiness and productiveness of the tree.

From Harold Jones, Maitland, Ont.

Crimson Beauty.—This apple was exhibited by Mr. Jones at the meeting of the Ontario Fruit Growers Association, at Woodstock, last December, who reported it as having been cultivated in the vicinity of Brockville for a number of years past. Description:—Medium size, oblate, regular. Skin smooth, shiny, covered with bright red to dark crimson, interspersed with large dots. Cavity, broad, open, slightly russeted. Stem, three-quarters of an inch long, moderately stout ; basin slightly irregular. Eye open. Flesh, white, firm, juicy, mildly sub-acid. Fameuse-like flavour, with a suggestion of astringency. Season, December to January. A handsome apple of good quality.

Herewith is appended a list of the most important samples of fruit received during the year. In addition to the list, a much larger number have been sent in for identification, all of which were examined with interest and pleasure and reported upon to the sender.

Sender.	Remarks.
F. L. Dery, Sault au Récollet, Que.....	Large, handsome, fall apple.
J. C. Bull, Weston, Ont	Six apples distinct from seed of Rambo.
W. H. Leef, Orillia, Ont	Fall apple ; worthy of trial.
A. W. Forfar, Ellesmere, Ont	Fall apple ; good quality, small.
Watson Griffin, Montreal, Que	Four varieties of apples ; fall.
C. H. Roberts, Paris, Ont	Apples, six seedlings ; too small.
A. McD. Allan, Goderich, Ont	Apples, two seedlings, winter . promising.
M. G. Bruner, Olinda, Ont	Apple seedling, early winter ; fair quality.
Thomas Connolly, Lindsay, Ont	Two seedling apples ; autumn ; fair quality.
J. Cuppage, Orillia, Ont	Four seedling apples ; early winter ; not promising.
G. H. Hale, Orillia, Ont	Seedling apple ; winter ; fair quality.
F. Crandall, Lindsay, Ont	Two promising seedling apples ; winter.
John Miller, Markham, Ont	Apple for name ; probably seedling.
S. C. Wilson, Whitby, Ont	Summer apple, of fair quality.
H. A. Bailey, Amherstburg, Ont	Peaches, two seedlings ; promising.
Allan Bros., Winona, Ont	Plum seedling, hardly promising.

NOTES ON THE BLOSSOMING OF FRUIT TREES IN CANADA.

The cause of the unfruitfulness of orchards has always, at horticultural conventions and elsewhere, been prolific of much surmise, conjecture, and, I may say, variation of opinion. The possibility of the trouble existing, at least in part, in the blossom has been mooted only in recent years. As a rule, I think we are prone to lay too much stress upon a single feature in the management of an orchard, and too little upon the collateral practices which make a harmonious and well-balanced programme in the life of the average apple orchard. Some orchardists pin their faith to varieties, others to location and cultivation, others again to manuring or pruning, and perhaps still others—though I have not yet heard of them—to spraying. Undoubtedly, we cannot expect orchards in which trees are so closely planted as to be fighting for nourishment and for living room at twenty years of age to continue long and of healthy and fruitful condition. In passing, I may say that in certain localities, with certain varieties, close planting is desirable, and may be practised with profit, but this is the exception. Nor is it reasonable to expect trees to continue to yield profitable crops of apples year after year, when year after year we are taking away from the soil and putting nothing back. But granted that the trees are planted at the proper distance apart, that they are cultivated, pruned and manured reasonably and rationally, we do not, in most cases, reap entire success, unless the good treatment has been followed up by judicious and well-directed efforts having in view the destruction of injurious and noxious insects. There are instances on record where, even after all this labour and all these various precautions have been taken, the orchard still remains obdurate, and refuses to bear, defying all attempts to coax it into fruitfulness. One says, root prune to stop superabundant growth ; another says, top prone to let in the light ; another says, give manure to stimulate ; another, seed down to check growth ; and still another, spray to induce fruitfulness. All these counsellors have been listened to, their advice acted upon, but still without success. We then begin to observe the conditions which surround orchards of a similar character. As a rule, these observations lead to the conclusion that varieties intermingled are more fruitful than those in which the varieties are

separated and planted in large blocks. Prof. Beach, in his admirable address on this subject, before the association at Orillia last year, cited a remarkable instance of this kind. The orchard was made up in part of Baldwins and of Greenings planted in blocks, and in part of Baldwins and Greenings mingled with other varieties. Where the two varieties mentioned were planted in blocks unmixed with other kinds they were unfruitful, but when mingled with other varieties the converse was true. This points at least to partial infertility of the blossom with its own pollen and points to the desirability of intermingling varieties in the orchard. In the case of certain varieties of American plums, this belief has prevailed for some time, and is no doubt well founded. The valuable investigations of Professors Beach and Waite upon grapes and pears clearly set forth a similar condition of affairs in the case of these fruits. Similar experiments with apples have been commenced at Ottawa, but need further confirmation before they can be announced with authority.

BLOSSOMING RECORDS.

An effort has been made, with the kind assistance and co-operation of a large number of the leading fruit growers of the Dominion, to secure a record giving the blossoming period of our leading large and small fruits. To those who so kindly assisted in this work the writer is deeply indebted. Small pass books, ruled and headed, were sent out, accompanied by a request as follows:—

“DEAR SIR,—The cause of the unfruitfulness of some varieties of large and small fruits when planted in large blocks by themselves is now understood to be due to self sterility, complete or partial, causing imperfect pollination and fertilization. The remedy is the intermingling of varieties in the orchard for the purpose of securing cross-fertilization. To obtain the best results the varieties adjacent to each other should blossom at, or about the same time.

“Accurate information with regard to time of the blossoming of the different varieties of fruit is much needed. Will you assist in securing data on this important subject?

“Please observe and record dates as follows:—The time of the opening of the first blossoms; when the tree is in full bloom; also the date of the fall of the blossoms; and forward your records to me at the close of the season.”

It is a matter of regret that the extreme and unusual heat of early spring, followed in Ontario by late May frosts, so disturbed the normal period of blossoming of fruit trees in most parts of the Dominion as to seriously impair the value of the records when their accuracy is considered from the standpoint of averages. The result of the abnormal heat was marked by a much shorter blossoming period than usual, with a hastening of all the later varieties. The records may be accepted as relatively indicative of the blossoming period of different varieties in the same locality, but more accurately correct of the same variety in different localities.

The records for British Columbia were kindly taken by Mr. Thos. A. Sharpe, Superintendent of the Agassiz Experimental Farm.

A TABLE OF AVERAGES, 1895.

SHOWING the Blossoming Period of some Leading Fruits throughout the Dominion.

Class.	Variety.	British Columbia.	Ontario.	Quebec.	Nova Scotia.	P. E. Island.
Apples.....	Alexander	May 7.....	May 19.....	May 16.....	June 5.....	June
	Baldwin.....	do 5.....	do 15.....	.....	.....	June 5.....
	Ben Davis	do 1.....	do 12.....	May 15.....	.....	do 9.....
	Duchess	Apl. 28.....	do 11.....	do 13.....	June 1.....	May 30.....
	Fameuse.....	May 4.....	do 11.....	do 14.....	do 2.....	do 31.....
	Golden Russet.....	.....	do 16.....	do 12.....	May 30.....	June 6.....
	Maiden's Blush.....	May 8.....	do 18.....	.....	June 3.....	do 5.....
	McIntosh Red.....	do 3.....	do 12.....	May 14.....	do 4.....	do 3.....
	Northern Spy	do 8.....	do 22.....	.....	do 8.....	.....
	Pewaukee.....	Apl. 30.....	do 17.....	.....	do 3.....	.....
	Ribston Pippin.....	do 30.....	do 23.....	.....	.....	.....
	Rox. Russet .....	.....	do 21.....	.....	.....	.....
	Talman Sweet.....	May 10.....	do 21.....	.....	June 7.....	June 10.....
	Wealthy.....	.....	do 16.....	May 12.....	do 5.....	do 3.....
	Wagener.....	.....	do 15.....	.....	do 4.....	do 6.....
	Yellow Transparent.....	May 3.....	do 15.....	May 13.....	do 2.....	do 2.....
Pears.....	Anjou.....	.....	May 10.....	.....	.....	May 30.....
	Bartlett.....	.....	do 14.....	May 13.....	May 28.....	.....
	Clapp.....	.....	do 12.....	.....	do 25.....	June 3.....
	Duchess .....	.....	do 13.....	.....	do 30.....	.....
	Flemish Beauty .....	.....	do 12.....	May 20.....	do 29.....	May 22.....
	Howell.....	.....	do 8.....	.....	.....	June 1.....
	Keiffer .....	.....	do 9.....	.....	May 25.....	do 1.....
	Seckel.....	.....	do 10.....	.....	.....	do 4.....
Plums.....	Sheldon.....	.....	do 10.....	.....	May 30.....	do 3.....
	Burbank.....	.....	May 8.....	May 10.....	.....	.....
	Bradshaw.....	Apl. 22.....	do 9.....	do 8.....	May 22.....	May 30.....
	Duane's Purple.....	do 18.....	do 8.....	.....	.....	.....
	German Prune.....	do 22.....	do 11.....	.....	.....	June 3.....
	Imperial Gage.....	.....	do 12.....	.....	May 23.....	do 3.....
	Lombard.....	.....	do 7.....	May 13.....	do 22.....	.....
	Moore's Arctic.....	Apl. 21.....	do 11.....	.....	do 20.....	June 3.....
Cherries..	Pond's Seedling	do 23.....	.....	.....	June 3.....	.....
	Reine Claude	do 17.....	May 13.....	.....	May 28.....	.....
	Early Richmond.....	Apl. 28.....	May 10.....	May 9.....	May 22.....	.....
	Governor Wood	do 21.....	do 9.....	.....	do 29.....	.....
	Montmorency.....	do 28.....	do 10.....	.....	June 1.....	.....
	Windsor.....	do 17.....	do 8.....	.....	May 29.....	.....
	Yellow Spanish.....	do 18.....	do 8.....	.....	.....	.....

SHOWING the Blossoming Period of some leading apples in Ontario, in 1895.

Variety.	Windsor.	Burlington.	Grimbsy.	Winona,	Niagara S.	Cataraqu.	Lindsay.	Graven-hurst.	Ottawa.
Alexander.....			May 18.			May 23.	May 19.		
Baldwin.....	May 9.	May 22.			May 9.				
Ben Davis.....	do 10.							May 12.	May 16.
Blenheim Orange.....		May 20.	May 20.						
Canada Baldwin.....		do 25.							May 16.
Cranberry Pippin.....		do 25.							
Duchess.....		do 12.		May 20.			May 13.		May 12.
Early Harvest.....	May 20.	do 17.					do 13.		
Fameuse.....	do 8.	do 20.		May 20.		May 15.	do 18.		May 13.
Greening.....	do 10.	do 23.		do 21.	May 12.	do 24.			
Golden Russet.....		do 25.		do 19.			May 17.	May 11.	May 20.
Haas.....							do 14.		do 13.
Longfield.....		May 22.							
McIntosh Red.....								May 10.	May 13.
Northern Spy.....	May 10.	May 27.		May 24.		May 28.	May 24.		do 25.
Ontario.....							do 22.		do 25.
Pewaukee.....							do 18.		
Ribston Pippin.....		May 22.							May 20.
Roxbury Russet.....		do 25.					May 21.		do 22.
Red Astrachan.....	May 6.	do 17.		May 15.		May 16.	do 13.	May 10.	do 20.
St. Lawrence.....	do 8.	do 22.				do 25.	do 20.		do 13.
Talman Sweet.....		do 25.	May 17.						do 20.
Tetofsky.....						May 16.	May 13.	May 8.	do 11.
Wagener.....		May 13.							do 17.
Yellow Transparent.....		do 18.					May 18.	May 10.	do 16.

SHOWING the Blossoming Period of some leading Pears and Plums in Ontario in 1895.

PEARS.

Varieties.	LOCALITY AND DATE.				
	Windsor.	Winona.	South Niagara.	Lindsay.	Gravenhurst.
Anjou.....		May 12			May 12
Bartlett.....	May 8	do 11	May 16	May 13	
Clapp.....	do 7	do 12-17		do 12	
Duchess.....	do 9		May 16	do 13	
Flemish Beauty.....	do 7	May 12		no 11	May 24
Howell.....	do 5	do 11			
Keiffer.....	do 7	do 11-13			
Seckel.....	do 9	do 12			
Sheldon.....		do 11			

PLUMS.

Varieties.	Windsor.	Winona.	South Niagara.	Gravenhurst.
Burbank.....		May 7	May 9	
Bradshaw.....		do 10		
Duane's Purple.....		do 8	May 8	
German Prune.....		do 11		
Imperial Gage.....		do 10	May 8	
Lombard.....	May 4	do 10	do 8	
Moore's Arctic.....		do 11		
Reine Claude.....		do 11	May 8	May 9

BLOSSOMING Period of some leading Apples in Quebec in 1895.

Varieties.	LOCALITY AND DATE OF BLOOMING.		
	Abbotsford.	Montreal.	Knowlton.
Alexander	May 12.....	May 15.....	.....
Ben Davis.....	do 12.....	do 20 .....	.....
Canada Baldwin	do 11.....	.....	May 19
Duchess of Oldenburg	do 10.....	May 13.....	do 15
Fameuse.....	do 11.....	do 18.....	.....
Golden Russet	do 11.....	do 14.....	.....
Haas	do 12.....	do 15.....	.....
Longfield	do 10.....	.....	May 16
McIntosh Red	do 11.....	.....	do 17
Red Astrachan.....	do 11.....	.....	.....
Winter St. Lawrence.....	do 10.....	.....	.....
Wealthy.....	do 12 .....	.....	.....
Yellow Transparent.....	do 8.....	May 6.....	.....

As may be seen from the preceding records, observations covering a great many points, from Prince Edward Island to British Columbia, were made. These are in no slight degree interesting merely from the standpoint of statistical record, showing as they do the great climatic variation discovered in travelling from west to east. If it is imperative to the fullest success, that varieties should be intermingled, then we should know the most suitable varieties to plant adjacent to each other, and this we can only ascertain by accurate observations extending over several seasons. These records also impress us with a fuller knowledge of the climatic variation found in the comparatively limited area of the fruit belt of Ontario. We find that Red Astrachan came into bloom at Windsor on May 3rd, South Niagara on the 8th, Burlington May 10th, Lindsay, 12th and Ottawa on the 15th May. Northern Spy opened its flowers at Windsor on May 8, South Niagara May 10, Burlington May 20, Lindsay 16th and Ottawa on 24th, being a difference of twelve days in one case and sixteen in the other. These two varieties also illustrate the comparatively wide differences in the habits of trees with regard to their blossoming periods. The difference would be much more strongly marked did Red Astrachan bloom with the earliest of its class. As a preliminary result of these investigations, the following groups may be arranged for Ontario according to the dates on which they were in full bloom :—

- 1. *Earliest Group*—Duchess, Fameuse, McIntosh Red, Ben Davis.
- 2. *Middle Group*—Baldwin, Golden Russet, Wealthy, Wagener, Yellow Transparent and Astrachan.
- 3. *Last Group*—Alexander, Maiden’s Blush, Northern Spy, Ribston Pippin, Roxbury Russet, Talman Sweet.

The pears easily fall into two groups as recorded the past season. It is probable that during the normal season the blossoming period of some will be much longer and probably considerably modified in many cases. They stand this year as follows :—

- 1. *1st Group*—Howell, Keifer, Seckel, Sheldon, Anjou.
- 2. *2nd Group*—Bartlett, Clapp, Duchess, Flemish Beauty.

PLUMS.

- 1. *1st Group*—Burbank, Duane’s Purple, Lombard, Bradshaw.
- 2. *2nd Group*—German Prune, Imperial Gage, Moore’s Arctic, Reine Claude.

CHERRIES.

In Ontario there was practically no difference in the blossoming period of different varieties last season.

These notes are offered only in a suggestive way to horticultnral observers who may be and, I may say, should be interested in this subject. Success will come to the fruit grower of the present and of the future very much in the proportion in which hard thinking enters into details of horticultural operations. Allow me to submit this subject as one of the details which will bear some thinking, and upon which I make bold to ask the co-operation of my friends, the professional fruit growers of Canada.

It is the intention to carry on the work again next year with the kind assistance of the fruit growers of the Dominion.

COOKING QUALITIES OF NATIVE PLUMS.

At present the principal value of native plums lies in their usefulness for culinary purposes—canning and preserving. One of the difficulties in the way of making a highly palatable preserve or canned product from some of these varieties is found in the peculiar astringent quality which seems to be a property of the skin and to some extent of the stone. Some of them while quite pleasant at first taste develop this astringent or “puckery” quality on chewing the skin. Again the astringency may not be marked when the fruit is eaten raw but when cooked it may become unpleasantly pronounced. The size of the stone has also an important bearing upon its value as a cooking variety, With a view of obtaining some information upon the relative astringency of the different varieties, and the proportion by weight of pit to flesh and skin, twelve average sized specimens of the following varieties were selected at as near the same degree of ripeness as possible. They were weighed, each plum cut in half and the varieties placed separately in porcelain bowls. Sugar was added to each, to the amount of half its weight, and water to the amount of one-tenth its weight, which was usually sufficient to moisten the sugar. The dishes were covered and placed over water baths where the fruit was cooked for an hour and twenty minutes. This of course was much longer than necessary, if intended for canning. The following notes were made after cooking and tasting, and are the combined opinions of a number of critical judges:—

Variety.	Weight of 12 plums in ounces.	Percentage weight of pits.	As- tringency scale, 1-10.	Remarks on Cooked Product.
De Soto.....	6.5	7.5	3	Light-coloured preserve.
Hawkeye.....	10.6	7.6	2	Skin dissolving, good.
Rollingston.....	6.5	8.6	4	Flavour pleasant.
Voronesh (seedling).....	5.7	11.8	4	Skin tough.
Van Buren.....	8.3	9.7	1	Quality, best.
Wolf.....	7.6	7.0	5	Preserve dark, watery.
Wyant.....	8.1	8.2	10	Skin tough, astringent.
Yosemite Purple.....	7.5	9.3	6	Attractive, bright-coloured.
Yosemite Yellow.....	7.0	12.5	6	Not attractive when cooked.

OBSERVATIONS ON VARIETIES.

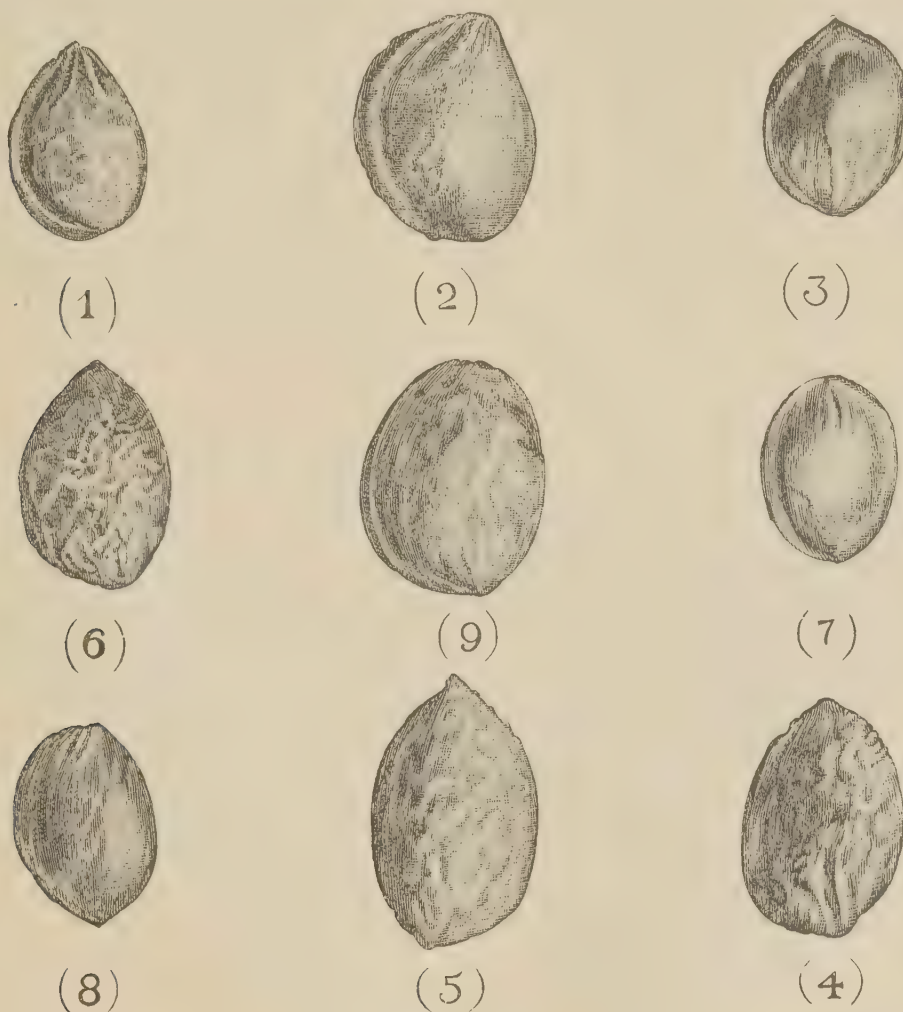
De Soto.—Sauce amber coloured, becoming lighter in colour with continued cooking. Cooks easily. Skin moderately tough. On the whole it may be said to be a good cooking variety. In quality it ranks among the best. It will be seen by reference to the table that by weight it has relatively a greater proportion of pit to flesh than the next, but a glance at the illustration will show that the weight is made up by greater thickness in the shell and decrease in size of cavity in the pit rather than increased size of

pit. The De Soto has many good points in its favour and is one of the most valuable of the American plums.

Hawkeye.—This is an exceedingly handsome fruit, covered as it is when mature with a beautiful lilac-purple bloom. It cooks easily, giving a deeply coloured sauce. The skin breaks up readily. A very desirable sort. Stone large but flat and thin, with prominent ridges and a tendency to develop wings on front edge.

Rollingston.—The appearance of this sauce was evidently impaired by too much cooking. Flavour pleasant, skin moderately melting. Stone roundish, rather large. This variety ripens a little earlier than De Soto. It is very productive and therefore should be included in plantations, where these varieties are found to be useful.

Voronesh.—(Seedling). As will be seen by a glance at the table, this has altogether too large a proportion of stone to flesh. This variety, as its name would seem to indicate, is not a Russian kind but a seedling of the *P. Americana* type.



(1) Wolf. (2) Van Buren. (3) Voronesh Seedling. (4) Wyant. (5) Yosemite Yellow. (6) Yosemite Purple. (7) De Soto. (8) Rollingston. (9) Hawkeye.

Van Buren.—An exceedingly handsome variety. Crimson and golden yellow in colour, a perfect free stone. When cooked, entirely free from astringency. The stone is however among the largest, there being over 10 pounds to each hundred pounds of fruit. The tree is neither as hardy nor as productive as Hawkeye.

Wolf.—This is usually rated as a free stone, but on cooking the stone clings quite firmly to the flesh. Skin dissolves readily in the mouth. Sauce is dark colour and inclined to be watery; rather astringent. Stone circular in outline, tapering towards the apex, with a prominent border. The percentage of stone to flesh is lower in this instance than in the last.

Wyant.—A curious fact about this variety is that when it is eaten raw the astringency is not prominent, but when cooked it becomes objectionably pronounced. Cooks easily, juice highly coloured, perfectly free. Stone medium size, oval ridge at margin.

Yosemite Purple.—Flesh does not break upon cooking but retains form, colour light amber, attractive. Skin astringent. Stone large, oval, sharply pointed. An attractive plum, somewhat lacking in quality.

Yosemite Yellow.—This variety does not cook readily. Sauce of a dark amber, somewhat muddy appearance. Skin breaks up readily but is quite astringent. Stone large rough oval, strongly clinging. On account of size of pit and astringency, this variety cannot be commended, although the tree is a profuse bearer.

As cooking plums, Hawkeye, De Soto and Van Buren are certainly the most desirable.

DWARF JUNE BERRY (*Amelanchier canadensis*; var. *Oblongifolia*, Torrey & Gray.)

The common Juneberry or shadbush (*Amelanchier canadensis*) grows wild over a large area of the country. Under ordinary conditions it reaches a height of fifteen to twenty-five feet. In the North-western States and in Western Canada dwarf varieties appear bearing fruit of edible size, and sufficiently good in quality to make it appreciated by the residents of those sections. Three or four varieties have been named and introduced. Among them we have "Improved dwarf," "Success," "Osage," and "Gardner." Thus far, there has been very little difference in the size or appearance of the fruit from these bushes, although the fruit is generally larger than the uncultivated types. This illustration is from a photograph taken of fruit produced by a plant in nursery row, at the Central Farm.



DWARF JUNE BERRY.

The fruit is very attractive in appearance, and quite palatable. Its resemblance to huckleberries applies to the flavour as well as the appearance. Large, well-ripened berries are richer and sweeter than blueberries.

In season, the fruit follows strawberries, coming in with currants. It ripens unevenly in the cluster, which in my opinion, is one of its chief weaknesses, as in

picking it is not so easy to select only the ripest berries, as may be done with raspberries, nor can the whole raceme be picked at once as may be done with currants.

It seems more than probable that for the North-west and Manitoba these improved dwarf forms will be much appreciated, and it is not improbable that they may be found useful in eastern Ontario and Quebec. It should be said that the birds appreciate juneberries quite as much as they do cherries, so that unless grown in large quantities or protected with bird netting, the owner is likely to have his returns considerably lowered by these robbers.

RASPBERRIES.

Some interesting results were obtained from the treatment of the rows in different ways during the year. Of the following 17 varieties of red raspberries, each is made up of two rows of plants 165 feet in length. As soon as the fruit was harvested in 1894, one row which had previously been cut back or summer pruned, had the old wood taken out in addition to some top pruning which took place at the same time. The other row was untouched. In the autumn, half of each row was laid on the ground, having only sufficient soil laid upon the ends of the canes to hold them down. Records are submitted of the yield obtained from each row together with the relative amount of injury sustained during winter. It will be seen that the estimated yield per acre for these varieties averages higher than those in the next table, not so treated.

	Length of row in feet.	PROTECTED.		UN-PROTECTED.		Date of first picking.	Date of last picking.	Yield of pruned row.	Yield of unpruned row.	Total yield in boxes.	Estimated yield in boxes per acre.
		Pruned scale of injury.	Unpruned scale of injury.	Pruned scale of injury.	Unpruned scale of injury.						
		1-10	1-10	1-10	1-10						
Heebner	330	10	10	7	7	July 8	Aug. 5	901 ¹ / ₄	96 ³ / ₄	187	3,527
Springfield.....	330	10	10	8	8	June 26	do 1	32 ¹ / ₄	49 ³ / ₄	82 ¹ / ₄	1,550
Royal Church	330	9	9	7	7	July 8	do 8	31 ¹ / ₄	37 ³ / ₄	69 ¹ / ₄	1,262
Carman	330	10	10	9	9	June 26	do 8	25 ³ / ₄	41 ³ / ₄	67 ¹ / ₄	1,268
Thompson's E'y Prolific..	330	10	10	8	9	do 26	July 29	36 ¹ / ₄	68 ³ / ₄	104 ³ / ₄	1,975
Herstine	330	10	10	8	8	July 8	Aug. 8	32 ³ / ₄	49 ³ / ₄	82	1,546
Parnell.....	330	10	10	7	7	do 4	do 1	32 ³ / ₄	37 ³ / ₄	70 ¹ / ₄	1,329
Golden Queen	330	9	9	6	6	do 6	do 8	40 ¹ / ₄	59 ³ / ₄	100 ¹ / ₄	1,889
Reeder	330	10	10	5	5	do 8	do 8	19 ³ / ₄	16 ³ / ₄	36	679
Brandywine.....	330	10	10	7	7	do 4	do 8	43 ¹ / ₄	64	107 ¹ / ₄	2,022
Niagara	330	9	10	7	8	do 2	do 8	22	46 ¹ / ₂	78 ³ / ₄	1,480
Marlboro	330	10	10	6	7	do 2	July 29	23 ¹ / ₄	27	50 ¹ / ₄	947
Hansell.....	330	9	9	7	7	June 26	do 23	31 ¹ / ₄	47	78 ³ / ₄	1,480
Clark	330	8	9	7	8	July 4	do 29	20 ¹ / ₄	37 ³ / ₄	58	1,093
Cuthbert	330	10	9	6	8	do 13	Aug. 8	35	70 ¹ / ₂	105 ¹ / ₂	1,989
Turner.....	8	8	9	6	8	do 2	do 1	23 ¹ / ₄	50 ³ / ₄	73 ³ / ₄	1,390
Caroline.	10	10	10	7	7	do 8	do 8	47	64 ³ / ₄	111 ³ / ₄	2,108

It will be seen (1) that the protected plants came through the winter in nearly every instance without injury—10 representing immunity ; the descending scale indicating increased injury ; (2) the yields from the pruned and unpruned rows show a balance in favour of the latter in almost every instance. This may seem contrary to what might have been expected, but is exactly in accordance with the actual returns.

In the following table data covering the length of the picking season, amount of injury sustained during the winter, the actual yield from the plants under test and the estimated yield per acre, is given. It will be seen that Kenyon and Columbian in this list lead for productiveness.

OTHER VARIETIES OF RED AND PURPLE RASPBERRIES.

Name.	Length of Row in feet.	Date of First Picking.		Date of Last Picking.		Yield in Boxes.	Estimated Yield in Boxes Per Acre.	Showing injury from Winter 1894-1895 Scale, 1 to 10.
Carter's Prolific (red).....	156	July	6..	Aug.	8..	47 ³ / ₄	1,904	7
Seedling of Biggar's (red).....	120	"	6..	"	5..	28 ¹ / ₄	1,465	6
Gregg, with Cuthbert & Snyder (hybrid)	150	"	15..	"	1..	11 ³ / ₄	487	7
Stayman's No. 5 (red).....	120	June	29..	July	23..	11 ¹ / ₄	583	9
Highland Hardy do	330	July	2..	"	15..	5	94	8
Superlative do	114	"	8..	"	22..	3 ¹ / ₂	189	5
No. 7, R. B. Whyte do	18	"	8..	"	15..	4 ¹ / ₂	1,555	9
Kenyon do	130	"	4..	Aug.	1..	60 ³ / ₄	2,916	10
Knevetts do	144	"	6..	July	26..	5 ¹ / ₄	226	7
Columbian (purple).....	12	"	15..	Aug.	5..	5 ³ / ₄	2,852	6
Hiram (red) ..	50	"	10..	July	29..	5 ¹ / ₄	715	9
Shaffers (purple).....	330	"	8..	Aug.	8..	91 ¹ / ₄	1,720	6
Hornet (red).....	175	"	10..	"	1..	12 ¹ / ₂	444	4
Champlain (white).....	112	"	6..	July	1..	8	444	5

YIELD OF BLACK CAP RASPBERRIES.

Smith's Prolific.....	45	July	8..	Aug.	1..	16	2,212	4
Souhegan.....	165	"	8..	July	20..	5	188	5
Babbitt.....	87	"	4..	"	15..	10	715	9
Smith's Giant.....	120	"	8..	"	18..	1 ¹ / ₂	77	5
Hilborn.....	400	"	6..	Aug.	1..	25 ¹ / ₂	794	6
Older.....	325	"	6..	"	1..	99 ³ / ₄	1,999	10
Palmer.....	39	"	4..	July	8..	4 ¹ / ₄	678	6
Progress... ..	300	"	4..	"	29..	123 ¹ / ₄	2,556	9
Ada.....	36	"	8..	"	18..	4 ³ / ₄	648	5

Black Caps, with few exceptions, have not been successful in the test plots. The amount of care they require to prevent the canes being broken in cultivating the plantation, together with their liability to be affected by disease, renders them often unsatisfactory and unremunerative.

The above table shows that Progress, Older, and Smith's Prolific were the most productive. The first named is somewhat dry and seedy and is not equal in many respects to the second.

BLACKBERRIES.

During the past five years about thirty varieties of Blackberries have been tested at Ottawa. The great majority have not proved hardy, being killed nearly to the ground each year. In accordance with the nature of the plant strong shoots are thrown up in the spring, but these, of course, only bear a limited amount of fruit. If treated like tender varieties of raspberries, they may be grown with a comparative degree of success by either of the following methods:—



SNYDER.

1. By allowing the canes to grow four or five feet high before trimming them, which makes them a foot higher when the growth has been completed. If grown in

this way in hills, and the canes tied to supporting wires, they should be laid down and covered in the autumn. This is accomplished by bending the canes to the ground in the line of the row and laying on sufficient soil to hold them down.



AGAWAM.

2. By growing them in hedge row form, pinching the young wood when it has attained a height of 15 inches. The laterals thrown out should be again cut back two or three weeks later. The varieties here reported upon have been grown in this way. The method is unreliable in the vicinity of Ottawa. Occasionally during winters of early and heavy snow fall, the yield is fairly satisfactory, but usually the plants are so severely injured as to cause a light yield.

The effect of mulching the ground with litter at the time of the ripening of the fruit, was tried. The results will be found in the tabular statement appended. A heavy mulch of green rye was applied when the berries began to colour. It was allowed to



ANCIENT BRITON.

remain on the ground throughout the remainder of the season. It will be seen that there was a slight increase in yield from the rows so mulched. As a means of adding humus to the soil and of retaining the much needed moisture in dry seasons mulching with some cheap material—or if nitrogen is needed with clover—is worth trying.

VARIETIES.

Agawam, Snyder and Ancient Briton (see illustrations) have proved the hardiest and most productive in this locality. In milder districts the larger fruited sorts are more profitable. Early Cluster gave very fair returns in comparison with hardier kinds. This variety fruits heavily on the young wood. Ancient Briton was the earliest variety in the collection, while Agawam was about twice as productive as any other.

BLACKBERRIES, YIELD, EFFECT OF MULCHING.

	Length of Row in feet	Date of First Picking.	Date of Last Picking.	Mulched. — Yield in Boxes.	Not Mulched. — Yield in Boxes.	Estimated Yield in Boxes Per Acre.	Showing Injury From Winter 1894-1895. Scale, 1 to 10.
Ancient Briton	97	July 5..	Aug. 10..	11..	9 $\frac{1}{2}$	1315	7
Agawam	165	do 26..	do 8..	16 $\frac{3}{4}$..	15 $\frac{3}{4}$	2452	8
Kittatinny	210	do 26..	do 8..	.....	9	266	7
Snyder.....	165	do 22..	do 8..	8 $\frac{1}{4}$..	3 $\frac{1}{2}$	443	6
Early Cluster.....	170	do 22..	do 8..	.....	2 $\frac{1}{2}$	805	7
Taylor's Prolific.....	330	Aug. 5..	do 8..	.....	1	18	3
Wilson's Junior.....	50	July 26..	July 26..	.....	$\frac{1}{8}$	15	1
Wachusett Thornless.....	330	do 26..	Aug. 8..	.....	4 $\frac{1}{2}$	85	6

STRAWBERRIES.

Owing to late spring frosts the yield of strawberries was greatly lessened in this vicinity. Dry weather prevailing during the picking season also diminished the crops perceptibly. Many varieties, as will be seen by the tabular statement of yields, failed altogether, others gave half a crop, while a few gave nearly a full return. The fruit, too, was of poor quality, the percentage of "button," or imperfect berries, being very large. Medium early varieties gave the best returns, which would seem to indicate that the fertilized blossoms were less affected by the frost than those which had not yet been fertilized. This strawberry plot was set out in the spring of 1893, in sandy loam, well manured. The treatment given it, up to date, is as follows:—The rows are 3½ feet apart, with the plants grown in matted form. The ground was cultivated and the runners kept down until midsummer, when the interspaces were mulched with manure. Any weeds appearing after this were pulled by hand or cut out with a hoe. After the ground was frozen in the autumn the whole bed was covered with a coating of oats straw, the lightest covering being given to the rows.

1894.

The plants came through in fine condition. The straw was removed before growth commenced, and the ground cultivated till the fruit began to ripen, when the straw was returned to the rows. Each variety was made up of two parallel rows, 30 feet in length. In order to test the effect of burning the leaves as a "rust" preventive after harvesting the fruit, as is often recommended, the foliage on one row of each variety was mowed off and burned, without removing it from the crowns of the plants. Where there was an extra amount of litter about the plants the crowns were somewhat injured, which in some cases had the effect of materially thinning the plants in the row so treated. The resulting growth was at first luxuriant and healthy, but rust soon appeared and made rapid headway, developing so quickly that there was little difference noticeable from a casual examination made in the autumn between the two series. On close examination however, a considerable improvement in favour of the burned rows was found to exist. In the autumn the plants were again covered with straw as previously described.

1895.

The plants came up through the winter as strong and healthy as in 1894, and would undoubtedly have given a heavy yield but for occurrence of the frost already noted. The treatment of the plot was the same this season as the year previous. There was no appreciable difference in the health of the two rows of plants—one of which had been burned

over in 1894 and the other untouched. An experiment with Bordeaux mixture to check this disease—strawberry leaf rust—gave more definite results. The plants were sprayed once before fruiting and twice afterwards. The results were most satisfactory, and now that this fungicide is so commonly used for other diseases, it will probably prove the best means of keeping the leaf rust in check. It should be remembered, however, that in burning the leaves the spores of the fungus are largely destroyed, and if this treatment is followed by the use of Bordeaux mixture there should be no difficulty in controlling the disease.

The course of treatment subsequent to picking the fruit was similar to that followed in 1896, the interspaces being manured during the summer. Another crop of fruit will be taken from these plants after which they will be ploughed under. The tabular statement which follows give interesting information regarding the date of blossoming, the period of ripening and the yield of ninety-five varieties tested this year.

STRAWBERRIES.

Variety.	Sex.	When Planted.	Date of Blossoming.	Date of First Picking.	Date of Last Picking.	Length of Row. ft.	Yield in Boxes.
Auburn.....	P	Sept. 1893	May 30..	June 20..	July 2..	60	9
Belmont.....	B	do 1893	do 29..	do 29..	.....	60	2 $\frac{1}{4}$
Black Giant.....	B	do 1893	do 28..	do 29..	.....	.....	1
Boynton.....	P	do 1893	do 25..	do 18..	do 4..	60	38
Beder Wood.....	B	do 1893	do 25..	do 18..	June 29..	60	8 $\frac{1}{2}$
Beverly.....	B	do 1893	do 25..	do 22..	July 2..	60	9 $\frac{1}{4}$
Barton's.....	P	do 1893	do 27..	do 20..	do 9..	60	11
Bubach.....	B	do 1893	do 23..	do 22..	do 2..	60	3 $\frac{1}{2}$
Cohansick.....	B	do 1893	do 27..	do 29..	do 9..	60	7
Crescent.....	P	do 1893	do 25..	do 20..	do 9..	60	31 $\frac{1}{2}$
Cameronian.....	B	do 1893	do 27..	do 29..	.....	60	1 $\frac{1}{4}$
Captain Jack.....	B	do 1893	do 27..	do 18..	July 9..	60	17 $\frac{1}{4}$
Crawford.....	B	do 1893	do 29..	do 28..	.....	60	1 $\frac{1}{4}$
Chair's.....		do 1894	.....	do 26..	July 2..	30	3 $\frac{1}{2}$
Charlie.....	P	do 1894	.....	do 20..	do 4..	60	10 $\frac{3}{4}$
Clark's Early.....		do 1894	.....	do 24..	June 26..	60	6 $\frac{1}{2}$
Daisy.....	P	do 1893	May 29..	do 20..	July 2..	60	9
Dayton.....	B	do 1893	do 27..	do 26..	.....	60	3
Daniel Boone.....	P	do 1893	.....	do 20..	July 2..	60	5 $\frac{1}{4}$
Dew.....		do 1894	.....	July 9..	.....	30	1 $\frac{1}{4}$
Early Canada.....	B	do 1893	do 23..	June 26..	.....	60	1 $\frac{1}{4}$
Edward's Favorite.....		do 1894	.....	do 26..	July 9..	30	1 $\frac{1}{4}$
Gandy.....	B	do 1893	June 1..	do 22..	do 9..	60	9 $\frac{1}{4}$
Green Prolific.....	P	do 1893	May 28..	do 18..	June 29..	60	7 $\frac{1}{2}$
Garibaldi.....	P	do 1893	June 1..	do 29..	July 2..	60	4 $\frac{1}{2}$
Hoffman's Seedling.....	B	do 1893	May 27..	do 29..	.....	60	1 $\frac{1}{4}$
Haverland.....	B	do 1893	do 25..	do 20..	July 9..	60	5 $\frac{3}{4}$
Itasca.....	B	do 1893	do 29..	do 26..	do 4..	60	5 $\frac{1}{4}$
Iowa Beauty.....	B	do 1893	do 20..	do 26..	do 9..	60	2 $\frac{1}{2}$
John Little.....	B	do 1893	do 25..	do 18..	do 9..	60	22
James Vick.....	B	do 1893	do 28..	do 20..	do 9..	60	.....
King of the North.....	B	do 1893	do 25..	do 26..	.....	.....	2 $\frac{1}{4}$
Logan.....	B	do 1893	do 28..	do 29..	.....	60	1 $\frac{1}{4}$
Leader.....	B	do 1893	do 27..	do 20..	July 2..	60	2 $\frac{3}{4}$
Mammoth.....	B	do 1893	do 27..	do 26..	June 29..	60	2 $\frac{3}{4}$
Miller's Seedling, O. 2.....	B	do 1893	do 27..	do 26..	July 2..	60	2 $\frac{3}{4}$
Miller's Seedling, H. 11.....	P	do 1893	do 20..	do 22..	do 2..	60	8
Mrs. Cleveland.....	P	do 1893	do 27..	do 20..	do 4..	60	10 $\frac{1}{2}$
Martha.....	P	do 1893	do 27..	do 22..	do 2..	60	10 $\frac{1}{4}$
Nicanor.....	B	do 1893	do 20..	do 29..	do 2..	60	1 $\frac{1}{4}$
Norman.....	B	do 1893	do 25..	do 24..	do 4..	60	3
New Dominion.....	B	do 1893	do 25..	do 22..	do 9..	60	19 $\frac{1}{4}$
Osceola.....	B	do 1893	do 25..	do 18..	do 26..	60	2 $\frac{1}{4}$
Pearl.....	B	do 1893	do 25..	do 18..	do 2..	60	12 $\frac{1}{2}$
Pine Apple.....	B	do 1893	do 27..	do 20..	do 9..	60	5
Prince of Berries.....	B	do 1893	June 1..	July 2..	.....	.....	3

STRAWBERRIES—*Concluded.*

Varieties.	Sex.	When Planted.	Date of Blossom- ing.	Date of First Picking.	Date of Last Picking.	Length of Row.	Yield in boxes.
						ft.	
Parker Earle.....	B	Sp. 1893..	May 25..	June 22..	July 9..	60	21 $\frac{1}{2}$
Princess.....	P	do 1893..	do 27..	do 24..	June 29..	60	4 $\frac{1}{2}$
Rio.....		do 1894..	.....	do 18..	July 9..	30	2 $\frac{1}{2}$
Robinson.....		do 1894..	.....	do 18..	do 9..	30	6 $\frac{1}{2}$
Stayman's No. 1.....	P	do 1893..	May 27..	June 18..	July 9..	60	20 $\frac{1}{2}$
Seneca Queen.....	B	do 1893..	do 25..	do 18..	do 9..	60	6
Shirts.....	B	do 1893..	do 29..	do 26..	do 2..	60	4 $\frac{1}{2}$
Standard.....	B	do 1893..	do 28..	do 20..	do 9..	60	14 $\frac{1}{2}$
Sharpless.....	B	do 1893..	do 27..	do 20..	do 9..	60	5 $\frac{3}{4}$
Shuckless.....	B	do 1893..	do 30..	do 24..	do 2..	60	2 $\frac{1}{2}$
Swindle.....	B	do 1894..	.....	do 22..	do 9..	30	5 $\frac{3}{4}$
Sandoval.....	B	do 1894..	.....	do 26..	do 4..	30	2 $\frac{1}{2}$
Surprise.....	B	do 1893..	May 27..	do 22..	do 4..	60	12 $\frac{1}{2}$
Tennessee Prolific.....		do 1894..	.....	do 18..	do 9..	30	7 $\frac{1}{2}$
Thompson's 66, late.....	P	do 1894..	.....	do 20..	do 9..	30	7 $\frac{1}{2}$
Turner's Beauty.....	B	do 1893..	May 27..	do 20..	June 29..	60	1 $\frac{1}{2}$
Van Deman.....	B	do 1893..	do 25..	do 20..	July 9..	60	8 $\frac{1}{2}$
Warfield No. 2.....	P	do 1893..	do 29..	do 18..	do 4..	60	23 $\frac{1}{2}$
Windsor Chief.....	P	do 1893..	do 27..	do 18..	do 9..	60	33 $\frac{1}{2}$
Wonderful.....	P	do 1893..	do 27..	do 18..	do 9..	60	15 $\frac{1}{2}$
West Brook.....	P	do 1893..	do 27..	do 18..	do 9..	60	4 $\frac{3}{4}$
Westlawn.....	P	do 1893..	do 29..	do 20..	do 2..	60	13 $\frac{3}{4}$
Williams.....	B	do 1893..	do 29..	do 22..	do 9..	60	17 $\frac{1}{2}$
Wilson.....	B	do 1893..	do 27..	do 18..	do 9..	60	17
Woolverton.....	B	do 1893..	June 4..	do 26..	June 29..	60	3 $\frac{1}{2}$
Yale.....	B	do 1893..	May 29..	do 24..	July 9..	60	5 $\frac{3}{4}$
1001.....	B	do 1893..	do 27..	do 22..	do 4..	60	11 $\frac{1}{2}$
SEEDLINGS.							
77/x.....	P	do 1893..	do 30..	do 26..	do 4..	60	8
297/x.....	P	do 1893..	do 27..	do 20..	do 9..	60	24
288/x.....	P	do 1893..	do 28..	do 20..	do 2..	60	8 $\frac{3}{4}$
66/x.....	P	do 1893..	do 25..	do 18..	do 4..	60	8
189/x.....	P	do 1893..	do 25..	do 20..	do 9..	60	12 $\frac{1}{2}$
134/x.....	B	do 1893..	do 25..	do 20..	June 29..	.....	6 $\frac{1}{2}$
272/x.....	B	do 1893..	do 26..	do 18..	do 29..	60	7 $\frac{1}{2}$
95/x.....	P	do 1893..	do 25..	do 18..	July 9..	60	7 $\frac{1}{2}$
164/x.....	B	do 1893..	do 20..	do 22..	do 2..	60	2 $\frac{3}{4}$
175/x.....	P	do 1893..	do 25..	do 20..	do 2..	60	13 $\frac{3}{4}$
346/x.....	P	do 1893..	do 29..	do 22..	do 9..	60	7 $\frac{3}{4}$
86/x.....	B	do 1893..	do 27..	do 18..	June 29..	60	9 $\frac{1}{2}$
357/x.....	B	do 1893..	do 25..	do 18..	July 9..	60	10 $\frac{1}{2}$
161/x.....	B	do 1893..	do 27..	do 20..	do 2..	60	12
103/x.....	B	do 1893..	do 27..	do 20..	do 2..	60	8 $\frac{1}{2}$
1/x.....	B	do 1893..	do 28..	do 26..	do 4..	60	2 $\frac{1}{2}$
341/x.....	B	do 1893..	do 27..	do 18..	June 29..	60	11 $\frac{1}{2}$
119/x.....	B	do 1893..	do 27..	do 22..	July 2..	60	4 $\frac{3}{4}$
146/x.....	B	do 1893..	do 27..	do 20..	do 4..	60	8
369/x.....	P	do 1893..	do 30..	do 20..	June 29..	60	4 $\frac{3}{4}$
6-G.....	B	do 1893..	do 28..	do 18..	do 29..	60	7 $\frac{1}{2}$

DEDUCTIONS FROM TABULAR STATEMENT.

The three most productive varieties were three pistillate sorts, viz., Boynton, Windsor Chief and Crescent. Two additional varieties giving good returns are Stayman's No. 1 and Warfield.

While 38 boxes were obtained as the highest yield from a pistillate variety (Boynton), 22 boxes was the greatest yield of a bisexual sort in this instance called John Little. Of other bisexual kinds giving fair yields—it may be said large from a comparative standpoint—are Parker Earle, Williams, Capt. Jack, New Dominion and Wilson. It should be noted that these varieties were all included in a table appearing in the report of last year “showing 25 varieties giving largest yields.”

Seedlings.—A large number of these have been produced and tested. Last year No. 297X ranked with the most productive of the named varieties. Again this year it has given excellent returns, so that it will be thoroughly tested at the branch farms the coming season in order to give it a more extended trial.

General Remarks.—Among the many errors which beginners in strawberry growing may fall into, none is attended with more serious consequences than that of limiting the plantation to a single variety, and that one not bisexual. At the beginning of the picking season this year I was requested by a young strawberry grower in this vicinity to visit and examine his grounds for the purpose of investigating the cause of the unproductiveness of his thrifty plants. As the plants were in flower it required only a glance to arrive at a solution of the problem. The plants were nearly, if not quite all of a pronounced pistillate type. Therefore the unfruitfulness was due to the inability of the blossom to fertilize itself. He was advised to at once replace every third or fourth row with a strong growing free producer of pollen like Capt. Jack, New Dominion, Beder Wood or Williams. It is well known that the pistillate varieties under favourable circumstances are the most productive, and the mistake came about in this instance, by the grower making up his new plantation entirely of the variety which had been most productive in the old. Another point which it is well to remember in commercial berry growing, is that the early berries are by far the most profitable. It is not here meant to convey the idea that the earliest varieties bring the most money because these are often comparatively unproductive but rather that the plantation furnishing the bulk of its berries in the fore part of the season is far more profitable than another field which may perhaps produce a greater quantity but which covers a longer and later fruiting period. In choosing a location for strawberries it is therefore extremely desirable that a piece of land be chosen which is warm and early, though well drained, yet not dry in nature, because this plant needs a good deal of moisture at fruiting time. Some growers continue the plantation for three years in the same place on account of the habit of the old plants ripening their fruit earlier than young plants. A difference of two or three days in time of ripening affects the financial result quite appreciably.

THE SAND CHERRY AS A STOCK.

A good deal has been said for and against the Sand Cherry (*Prunus pumilla*) as a suitable dwarfing stock for Morello cherries.

Some experiments along this line are delineated in the accompanying tabular arrangement. It will be seen that both in grafting and budding they were unsatisfactory.

When the Sand Cherry was crown and stem grafted upon American plum stocks the union secured and growth made were all that could be desired.

Some of the improved varieties are so sprawling and drooping in habit as to make it necessary to graft them upon an upright stem. For this purpose the native plum will be most useful.

THE SAND CHERRY AS A PROPAGATING STOCK FOR MORELLO CHERRIES.

THE SAND CHERRY ON PLUM STOCKS.

	Number of buds inserted.	Number which grew.	Remarks.
Budded on Sand Cherry Stocks in 1893.			
Strauss cherry.....	58	3	Many grew for some time, but then died.
Riga 18 do	51	1	Union imperfect.
Amarelle Hative, cherry.....	71	1	do
Minnesota Ostheim, cherry.....	93	.....	do
Russian No. 3, plum.....	24	12	Fairly good union, moderate growth.
De Soto plum.....	25	13	Fairly good union, moderate growth.
May 2nd, 1894, root grafted on Sand cherry and planted out Cherry buds beginning to open —			
Spate Amarelle cherry.....	10	.....	Leafed out, but did not unite.
Lutovka cherry.....	10	.....	do do
Bessarabian cherry.....	10	.....	do do
Wolf plum.....	10	6	Weak growth, poor union.
Glass Seedling plum.....	10	2	do do
De Soto plum.....	10	1	do do
Yellow fruited Sand cherry grafted on stems of American plum, 19th April, 1895.....	14	10	Good union, strong growth.
Yellow fruited Sand cherry grafted on stem of Canadian Seedlings, 19th April, 1895.....	15	11	do do
Sand cherry, large fruited, Crown grafted on American plum, 19th April, 1895.....	12	9	do do
Sand cherry, large fruited, Crown grafted on Canadian plum Seedling, 19th April, 1895.....	31	24	do do

SPRAYING EXPERIMENTS.

Fungous diseases affecting fruits were much less prevalent, and therefore less injurious the past season than in previous years. The quality of the winter apples being much better than growers have had the good fortune to see for a number of years past. The improvement in quality may also in part be credited to the greater care now being exercised by orchardists in carrying out fully those operations which contribute to the health and vigour of a fruit tree, viz., manuring, cultivating, pruning and spraying. To the latter practice should be credited in the best fruit districts a generous share of the improvement noted in the quality of the fruit.

It is pleasing to note the efforts put forth and interest manifested not only by the individual, but by the legislative bodies of the fruit growing provinces.

I would draw special attention to the good work done by the Department of Agriculture of the province of Ontario the past season in carrying on under the efficient superintendency of Mr. A. H. Pettit, of Grimsby—but on a much more extended scale—the co-operative spraying experiments instituted by this division last year in conjunction with the Provincial Fruit Growers Association, the convincing results of which are given in the Annual Report for 1894, in addition to Bulletin No. 23.

With a view of encouraging the practice of spraying and demonstrating its beneficial effects meetings were held, by instruction of the Minister of Agriculture, at two points in the province of Quebec, viz., At Notre Dame de Grace near the city of Montreal and at St. Jean Port Joli, L'Islet County, province of Quebec. The first locality has long been noted for its large production of fine Fameuse apples; the latter for producing in considerable quantity Damson and Orleans plums. At these meetings addresses were given by myself explaining the why and wherefore of spraying; the

addresses were followed by a practical demonstration of how to prepare, and apply Bordeaux mixture. The owners of the trees which were treated in each case agreed to continue the spraying under my direction, as long as necessary and to report the results of their work in the autumn. This agreement they faithfully carried out. I append the reports of Messrs. Descarries and Verreault, which speak in satisfactory terms of the results of the experiments.

NOTRE DAME DE GRACE, QUE., September 20th, 1895.

JOHN CRAIG, Esq.,
Horticulturist, Experimental Farm,
Ottawa.

DEAR SIR,—I may be late in sending my report on the condition of the trees treated by you for the prevention of apple spot last spring, but I was anxious to ascertain, at the different periods of apple growth the results of spraying, both on the trees and on the fruit.

In order to ascertain the effects, special observations have been made on the trees upon which you conducted your experiments. These trees were selected amidst an old orchard that had given a very poor return the previous year. I was thus better able to notice the change obtained by spraying. The trees selected for the experiments were of two different kinds; three large trees of "Fameuse" and one of "Peach Apple." The first spraying was done by yourself some time before the blossoms had opened; then I sprayed again three times, as you advised me to do; one just before the blossoms opened, the second after that time, the third some time later.

For the three sprayings I did myself, the Bordeaux mixture was used as recommended in your circular in April, 1895:—

Sulphate of copper	4 lbs.
Lime	4 lbs.
Paris green	4 ozs.
Water	50 gls.

Following is a statement showing the effect on the trees treated by you, also on those treated by myself, as I operated on all my trees with the Bordeaux mixture, except on 40 that I reserved to find out the difference between the sprayed and the unsprayed trees. The trees which were sprayed as above are now very healthy, the foliage is luxuriant and very green, a condition that I never observed in preceding years.

With regard to the fruit, there is a great improvement. The effects are more clearly shown on the "Fameuse" than on the other sorts, especially on the "Peach Apple," on which I noticed but slight change. The "Fameuse" apples are much less spotted than in preceding years; they are larger and better coloured. I regret not to be able to report as good results for the quantity as for the quality, for my trees bore but little this year; but I think the frost we had at the time of blossom opening was the cause of such a small crop.

The 40 trees I kept unsprayed did not bear a larger crop than the sprayed ones, and their apples are certainly inferior to the latter. I have even noticed the benefit of spraying on the same trees, that either on account of wind or their position I was not able to spray fully on both sides. In such cases there was a considerable difference between the fruit of the sprayed sides and that of the unsprayed side.

The greatest number of the orchard owners of Notre Dame de Grace and its surroundings, after hearing your instructive lecture of last April on the spraying of apple trees, have followed your advice and are altogether satisfied with the beneficial results they have obtained.

In closing this report, allow me, sir, to express my gratitude for the services rendered by the Experimental Farm in teaching the way of saving our valuable apple crop by destroying the pests of our orchard.

Very truly yours,

D. J. DESCARRIES.

ST. JEAN PORT JOLI, QUE., 15th October, 1895.

JOHN CRAIG, Esq.,
Horticulturist, Experimental Farm,
Ottawa.

DEAR SIR,—I should have reported to you sooner concerning the spring and summer spraying of my orchards.

Following your visit to St. Jean Port Joli, authorized by the Department of Agriculture, the spraying of my orchard began under your direction, and was continued the next day, using the same composition, the Bordeaux mixture, which I think is :

Sulphate of copper	4 lbs.
Lime	4 lbs.
Paris green	4 ozs.
Water	1 bbl.

The whole being dissolved according to the instructions given in your bulletins.

The spraying was repeated under my care a second and a third time, on the dates mentioned in your instructions. I used, for the spraying, the pump you furnished ; but my orchard being irregularly planted (it is an old orchard) rendered it difficult to spray with advantage. A lighter pump, perhaps, would have answered better—a pump that could have been carried by hand on a small truck. Notwithstanding this disadvantage, the good effect of the treatment was clearly apparent. I remarked a cleaner foliage, that the caterpillars had disappeared, and that the crop of plums was of fine quality and very satisfactory.

Now the people of this locality who are interested in horticulture have an idea of the importance of spraying—a method unknown so far in this district—and will, I hope, try it in future.

It should be said that all those interested in horticulture are thankful to the Department of Agriculture and to yourself for the interest shown in making the experiments, and sending you to operate and explain, in the way you have done.

Yours very truly,
P. G. VERREAULT.

In Ontario Messrs. A. H. Pettit & Son, of Grimsby, again carried on spraying experiments in continuation of those begun the year previous. The same apple trees were sprayed in the same manner and with the same mixtures (Bordeaux mixture, five applications with Paris green) as in 1894. Mr. W. H. Pettit writes as follows :—

GRIMSBY, ONT., 7th January, 1896.

“I inclose you a statement of the results secured this year from the trees which have been sprayed with Bordeaux mixture the past two years. I am sure that you will think with me, the number of barrels shipped this year compared with other years speaks well for the benefits of spraying.

1 tree	Blenheim Pippin, sprayed,	1 barrel good apples.
1 do	do	not sprayed, none.
1 do	Baldwin, sprayed,	1 barrel good apples.
1 do	do	not sprayed, 1 barrel good apples.
3 do	Greening, sprayed,	2 barrels good apples.
3 do	do	not sprayed, 1 barrel good, 1 barrel seconds, 1 barrel third.
3 do	Red Astrachan, sprayed,	5 barrels good apples.
3 do	do	not sprayed, 15 barrels good apples.
1 do	A. G. Russet, sprayed,	none,
1 do	do	not sprayed, none.
1 do	Coopers Mkt., sprayed,	2 barrels good apples.
1 do	do	not sprayed, none.
1 do	Cranberry Pippin, sprayed,	1 barrel good apples.
1 do	do	not sprayed, none.

The three Greening trees (sprayed for two years) on one side only, averaged about six barrels per tree, mostly good fruit. All the sprayed trees bore heavily last year, consequently they gave a light crop this year. I might also add that from our orchard, which was sprayed from three to five times last year and the same this year, we shipped the present season nearly 700 barrels of apples; other years not more than 100 to 175 barrels.

W. H. PETTIT.

At Winona, experiments were again kindly undertaken by Mr. Murray Pettit. The work here was also a continuation of the experiments inaugurated the year previous, and had for its main object the prevention of scab and spot on pears. The definiteness of the results was very much marred, however, by the severe and unexpected frosts of early May. Mr. Pettit, writing on June 6th, states that the "show of pears is very fine, but they seem to be affected by a fungus causing a russetting of the fruit near the calyx." Specimens accompanied this letter which showed very plainly the effect of the frost. Nearly all varieties were injured so severely as to cause them to drop prematurely, resulting eventually in a very slight crop.

WINONA, ONT., 3rd January, 1896.

In reference to the spraying experiments carried on this year, I have very little to report on account of the almost entire absence of fungous diseases the past season. I could, however, see the results of the previous year's experiments conducted under your instructions on Greening apples and on Flemish Beauty pear trees.

The apple trees sprayed, both this year and last, showed much larger and healthier leaves, and during the earlier part of the season the fruit appeared larger than those only sprayed this year. Two Flemish Beauty pear trees, in the row sprayed last year under your instructions, were left unsprayed this year as a check and showed some fungus, both on leaf and fruit, while those sprayed both seasons were perfectly clean. Again, the trees left unsprayed last season but carefully sprayed this year showed more fungus than the two pear trees referred to. My experiments on grapes and plums gave no results, as the entire crop was clean and good.

MURRAY PETTIT.

EFFICACY OF ARSENATE OF LEAD AND PARIS GREEN APPLIED WITH AND WITHOUT BORDEAUX MIXTURE.

At page 120 of the annual report for 1894 the results of an experiment are given, which go to prove that Paris green was sufficiently effective as an insecticide when applied with Bordeaux mixture to warrant the use of it in this way. The experiment was continued the past season along the same lines as last year, the same mixtures being used with the addition of arsenate of lead, a new insecticide already noticed in the report of the entomologist. A row of crab trees were used for the experiment, check trees being reserved for Bordeaux mixture alone, while other trees were not sprayed with a view of obtaining comparative results. Arsenate of lead was used at the rate of 1 pound to 150 gallons of water, Paris green at the rate of 1 pound to 200 gallons of water, and in the same proportion with Bordeaux mixture prepared by using 4 pounds each of copper sulphate and lime in 45 gallons of water. Four applications were given, commencing immediately after the blossoms had fallen. The results are given in detail in the following table. It will be seen that there is considerable variation in the results

obtained in the treatment of individual trees. The average percentage of wormy fruit, however, stands as follows:—

Arsenate of lead and Bordeaux mixture.....	2·15
Arsenate of lead.....	5·60
Paris green.....	6·38
Paris green and Bordeaux mixture.....	6·64
Bordeaux mixture	7·46
Unsprayed	14·45

Although the value of insecticides applied in the form of spray for the prevention of codling moth, has long been demonstrated by the entomological division, the additional evidence brought out thus incidentally affords some satisfaction.

SHOWING PERCENTAGE OF WORMY FRUIT.

Variety.	How treated.	Grade of fruit.	Percentage wormy.	Average.
Ball's Winter.....	Unsprayed.....	Handpicked	1·5	} 11·75
do	do	Fallen.....	22·0	
do	Bordeaux mixture.....	Handpicked	4·3	} 7·15
do	do	Fallen.....	10·0	
Chicago.....	Arsenate of lead and Bordeaux mixture.....	Handpicked	2·4	} 2·15
do	do	Fallen.....	1·9	
do	Paris green and Bordeaux mixture	Handpicked	·26	} 6·64
do	do	Fallen.....	13·3	
Dartmouth	Bordeaux mixture.....	Handpicked	3·1	} 3·50
do	do	Fallen.....	3·9	
Jumbo.....	do	Handpicked	3·3	} 9·35
do	do	Fallen.....	15·4	
do	Paris green.....	Handpicked	14·0	} 10·0
do	do	Fallen.....	6·0	
Hyslop.....	Unsprayed	Handpicked	11·0	} 17·15
do	do	Fallen.....	23·3	
Orion Crab.....	Paris green.....	Handpicked	5·9	} 5·9
Orange.....	Bordeaux mixture.....	do	4·1	
do	do	Fallen.....	6·7	} 5·4
do	Paris green.....	Handpicked	2·9	
do	do	Fallen.....	3·7	} 3·3
Quaker Beauty.....	do	Handpicked	12·6	
do	do	Fallen.....	13·6	} 13·1
do	Bordeaux mixture.....	Handpicked	11·8	
do	do	Fallen.....	12·5	} 12·15
Rose of Stanstead.....	Paris green.....	Handpicked	2·1	
do	do	Fallen.....	7·9	} 5·0
do	Bordeaux mixture.....	Handpicked	2·4	
do	do	Fallen.....	20·0	} 11·2
Transcendant.....	Paris green.....	Handpicked	3·0	
do	do	Fallen.....	4·9	} 3·95
do	Bordeaux mixture.....	Handpicked	4·0	
do	do	Fallen.....	4·6	} 4·3
Van Wyck.....	Arsenate of lead.....	Handpicked	1·8	
do	do	Fallen.....	9·4	} 5·6
do	Paris green.....	Handpicked	3·7	
do	do	Fallen.....	3·0	} 3·35

LYSOL—A NEW FUNGICIDE.

During the past two years a number of fungicides new to horticulturists have been brought forward. None perhaps attracted more attention, coming as it did, recommended by French and German fruit growers, than Lysol. Successful results have also been reported in the United States, in the treatment of fungous diseases affecting fruits, with this agent. It was particularly recommended as a remedy against peach curl.

With regard to the nature and composition of this substance Mr. Shutt, chemist, speaks as follows :—"There are many products obtained from the destructive distillation of coal-tar, differing in composition according to the nature of the process and the heat employed. Among them are several thick fluids possessing a strong odour akin to that of carbolic acid and having marked qualities as germicides. These are sold as disinfectants and antiseptics under various names, such as Cresol, Lysol, and Creoline." Of its manufacture and properties Mr. W. E. Saunders, of London, writes: "This is said to be a 50 % solution of cresols made by dissolving them in alcohol and then saponifying. It is soluble tolerably freely in water. These cresols (cresylic acid and its allies) are closely related to carbolic acid, coming out in the same process of manufacture, though at a different stage. Cresylic acid is said to be a more powerful germicide than carbolic acid and is non-crystallizable—at least at ordinary temperatures."

In order to ascertain the effect of lysol upon foliage some preliminary tests were made upon a variety of plants in the greenhouse. Solutions were made containing respectively one, two, three and four per cent of lysol. Two applications were given in bright sunshine to each of the following plants and with results as shown below :—

Plant.	STRENGTH OF FUNGICIDE EFFECT.			
	1 per cent.	2 per cent.	3 per cent.	4 per cent.
Geranium.....	No injury.....	No injury	No injury	No injury.
Strawberry.....	do	do	do	do
Hibiscus	do	do	do	do
Abutilon.....	do	do	do	do
Streptosolen.....	Slight injury..	Some injury	Considerable injury..	Badly injured.
Heliotrope	do	do	do	Leaves nearly killed.
Hydrangea.....	No injury	No injury	No injury	No injury.
Spiræa Japonica..	do	do	do	do

It will be seen that with the exception of Streptoslen, a handsome greenhouse plant belonging to the order of *Solomonaceæ* (potato and tomato family) and heliotrope, none of the species treated were injured. The effect of lysol of the strength above noted upon plant lice was very slight. Upon mealy bug (*Coccus*) two applications of a one-per cent solution materially decreased their members.

TO PREVENT PEACH CURL.

Comprehensive experiments were planned and carried out with the co-operation of Mr. W. W. Hilborn, Leamington, and Mr. R. B. Blake, Cedar Springs, both of Essex County, Ontario.

These experiments had for their object the determination of the following points :—

1. To determine the value of lysol as a fungicide.
2. To determine the proper strength to use.
3. To determine the number of application that would give the best results.

In addition, diluted Bordeaux mixture was used to learn its value in preventing peach leaf curl and soft rot of the fruit. A personal visit was made to Leamington and the first application was made in the orchard of Mr. Hilborn, on April 4th. The subsequent applications were made by Mr. Hilborn. The details of the experiments in Mr. Blake's orchard were arranged by correspondence, and the work was carried on by the owner. Unfortunately for the conclusiveness of the experiment, but fortunately for the fruit grower, peach curl did not appear, at least to an appreciable degree, in that vicinity this year, so that no information along that line was obtainable.

With regard to its effect on the foliage, no injurious effects were reported by Mr. Hilborn or Mr. Blake.

Specimens of the twigs and leaves treated were forwarded by Mr. Blake on June 18th, on which the following notes were made:—

“Lysol—1½ per cent solution. Leaves healthy; no apparent injury after four applications.”

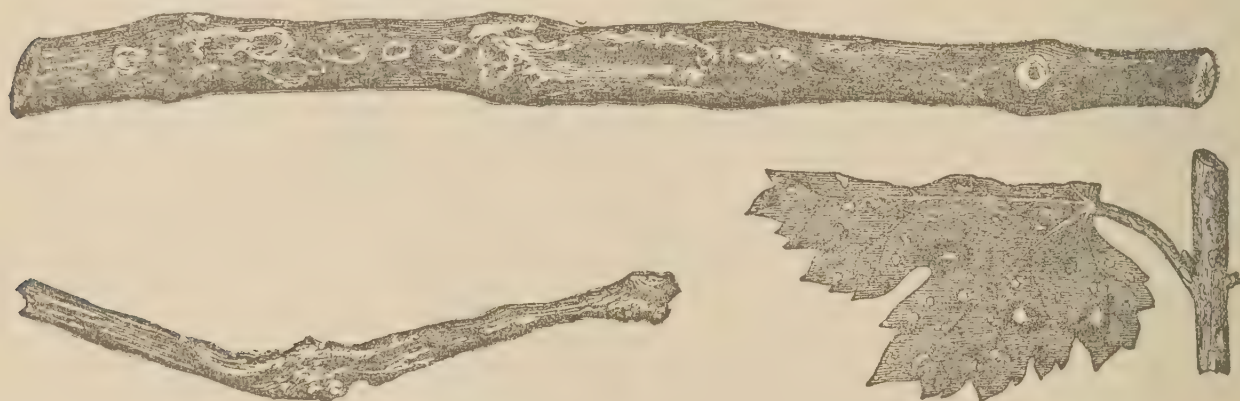
“Bordeaux mixture—three pounds each of copper, sulphate and lime, and two ounces of paris green, to 45 gallons of water. Leaves badly scorched.” Mr. Blake reports trees “badly damaged.”

“Abundance and Bradshaw plums sprayed with mixture were not injured.”

I have previously noted slight injury following the application of Bordeaux mixture, of this strength, to peach foliage; the augmented injurious effects in these cases would seem to be caused by the addition of paris green. Mr. Hilborn's experience did not corroborate this result, which renders the explanation more difficult. There is no doubt, however, that Bordeaux mixture and paris green should be applied to peach foliage with much caution, and when injury follows it will be advisable to apply the fungicide by itself, and follow with paris green and lime—two ounces of the former and one pound of the latter to each 50 gallons of water.

SOME INJURIOUS FUNGOUS DISEASES.

ANTHRACNOSE OF THE GRAPE (*Sphaceloma ampelinum*). This disease was described and its appearance figured in the Horticulturist's Report for 1893. Since that time it has continued to attract an increasing amount of attention in Eastern Ontario and Quebec. In the Experimental Farm vineyard it has been the most difficult to control of any of the parasitic diseases attacking the vines. Among the varieties most subject to attack are the Red Rogers, Norwood, Vergennes and Eldorado.



Showing Anthracnose on cane and foliage.

Only the most persistent spraying and frequent removal of diseased berries have kept it in check. The disease not only destroys the fruit, but defoliates the vines by attacking the young wood and leaf petioles.



Anthracnose on the fruit.

Infested vineyards should be sprayed before growth starts, with copper sulphate, one pound to twenty-five gallons of water. Great care should be exercised in making the application, so that every cane and spur is thoroughly covered. The subsequent sprayings should be made with Bordeaux mixture, which has proved the most effective agent in preventing its development. All diseased fruit and foliage, as far as possible, should be promptly removed and destroyed.

ANTHRACNOSE OF THE RASPBERRY (*Gleosporium venetum*).

The life-history of this disease is given in Bulletin No. 22. A large number of samples of raspberry canes exhibiting the characteristic effects of the presence of this disease, have been received from various parts of the Dominion during the past year, showing that its presence is now wide-spread. Diseased plants are readily recognized.



They have small buds and unhealthy looking leaves. The vegetative portion of the fungus penetrates the intercellular spaces of the tissue of the host plant and robs it of its food material. The disease reproduces itself by means of summer spores which are distributed by natural agencies, and it is probably carried through the winter by means of the vegetative portion or mycelium of the fungus, which is supposed to be of a perennial character.

Treatment.—Where plantations are badly infested, the best policy will be to root them up and burn the plants. Where the disease has not obtained a serious foothold, remedial measures may be instituted with success, as follows :—

1. Spray with Bordeaux mixture in the autumn as soon as the canes have been pruned, after harvesting the fruit.
2. Spray early in spring, before the leaves open.
3. Spray again when the young canes appear above ground.
4. Make another application just before blooming time, being careful to cover all the young wood and foliage.

LEAF SPOT OF THE VIOLET (*Cereospora Violae* Sacc.)

Among florists this is regarded as a serious disease. Samples of injured foliage have been received from various sources. I am indebted to Dr. B. D. Halsted of the New Jersey Experimental Station for kind assistance in connection with the identification of diseases affecting specimens submitted. The disease manifests its presence at first by the appearance of small dark specks on the surface of the leaf. These dark centres soon become surrounded by a lighter coloured margin which increases in size till it attains the diameter of a quarter of an inch or more. A single violet leaf may have a dozen or more of these spots. The affected tissue dies away, and finally the whole leaf. The dark centres contain, as Dr. Halsted says, a “a multitude of spores.” These propagate the disease.

Treatment.—While fungicides such as Bordeaux mixture, ammoniacal copper carbonate, and diluted copper sulphate, are beneficial preventives, yet florists do not as a rule begin using them till the disease has become established, when it is too late to expect the best results. Experiments conducted in the violet house of Mr. C. Scrim, of this city, indicate that Bordeaux mixture is the best preventive agent of the three mentioned. It is, however, objectionable on account of staining the foliage and flowers. Ammoniacal copper carbonate gave nearly as good results, and I am inclined to recommend it as preferable for florist's for use.

Dr. Halsted has pointed out that there is another disease (*Phyllostica violae*, Desm.) which may be a form of this species, at any rate which much resembles it in its effect upon violets, that may be treated in the same manner. Whether spraying is possible or not, the desirability of promptly removing all diseased foliage should be borne in mind.

RUST OF THE CARNATION (*Uromyces Caryophyllinus*, Sar.)—This disease ranks easily among the most destructive parasites known to the grower of carnations. The following excellent description is given by Dr. Halsted.

“The rust is most easily distinguished of all. It is due to a fungus (*Uromyces caryophyllinus*, Sar.) that develops blister-like patches upon the leaves and stems, which afterwards produce a rusty powder in considerable abundance. This is one of the most recent and the most troublesome of the carnation diseases. Before the blisters appear upon the plant the fungus has grown for some time in the tissue of the infested part, and the advance sign of the blisters is a pale colour in patches several times larger than the blisters which are to follow. When the part is badly infested, the destruction of the green substance (*chlorophyll*) is quite general, so that the plant may have a decidedly sickly appearance.”

Treatment.—Various experiments have proved that this disease may be prevented by spraying with the coppersalt fungicides. Dr. Halsted recommends four ounces of copper sulphate to a barrel of fifty gallons of water. Bordeaux mixture may be used early in the season, before the flower buds form. Owing to the glaucous nature of the carnation leaf it is somewhat difficult to secure an even distribution of the fungicide upon its surface. By the addition of a gallon of molasses to each barrel of the spraying mixture and by using a vermorel nozzle, aided by a strong pump, a fine misty spray is formed, which effectually covers the plants. Early precautionary treatment is strongly advised. In propagating carnations great care should be exercised in selecting stock absolutely free from the disease from which to take cuttings.

EXPERIMENTS WITH SQUASHES.

Extended varietal tests with squashes have been carried on for the last two years, the detailed results of which are submitted in the accompanying tabular statement. All cultivated varieties of squashes have, according to the most eminent botanical authorities, been derived from three wild types, viz., *Cucurbita maxima*, Duch., *Cucurbita moschata*, Duch., and *Cucurbita pepo*, Linn. The assignment of each cultivated variety to its original progenitor results in a more or less arbitrary classification, on account of their wonderful variability; yet such has been accomplished with apparent success by M. M. Vilmorin & Andrieux, the noted seedsmen of Paris, in their excellent work on "The Vegetable Garden."

The squash, like the corn, tobacco and tomato plants, are natives of warm climates, therefore need for their best development, soil and treatment which will tend to hasten their natural period of maturity. While the majority of the cucurbits (squashes) will ripen their fruit within the limits of our summer season if in warm soil, it is desirable in order to forestall, or lengthen the out-door period by starting the garden varieties in a hotbed. The seed may be sown in pots, four to six in each pot, or planted in inverted sods placed in mild hotbed soon after the middle of April in this vicinity. Both methods were tried in these experiments with little if any difference in the plants so treated.

Where a large number are grown four or five inch pots are more easily and expeditiously handled than the squares of sod, which are apt to break apart in transplanting. When pots are not available and the number of plants required only sufficient to meet the needs of the average household, the sod method is to be commended. In this experiment the plants were set out early in June in sandy loam between rows of young apple trees. Good sized holes were dug twelve feet apart, and re-filled with good surface soil, adding about one-third of barn-yard manure. After setting the plants they were cultivated either by horse or hand once in 10 days till the runners began to take possession of the inter-spaces. No effort was made to prevent them rooting at the joints, although it may be said in passing that extra large specimens may be obtained by reducing the number of fruits upon a single runner, and at the same time encouraging the vine to root by covering it with soil at one of the joints. Among the most desirable forms of summer squashes for garden culture are the bush or non-running varieties, belonging to the vegetable marrow section (*C. pepo*). These are peculiarly adapted to garden culture or in limited areas. They are exceedingly productive and are a much appreciated addition to the list of summer vegetables by those who have grown them.

Interesting data are given in the following table regarding the period of maturity, the yield, size, appearance and productiveness of fifty-six varieties.

TEST OF SQUASHES, 1894-95.

Variety.	When tested.	Seedsman.	Date of Sowing.	Date of Planting out.	No. of Hills Planted.	When Ready for use.	No. Matured before Frost.	Weight of two Specimens—lbs. & ozs.	Size—diameter: in.	Depth of Flesh. in.	Size of Cavity—diameter. in.	Colour of Flesh.	Remarks on Vines and Fruit each year.
Butman	1894	Thorburn ..	April 23..	June 11..	2	.....	9	31.4	10	1 $\frac{3}{4}$	6 $\frac{3}{4}$	Salmon.....	Resembles Hubbard quite closely, but is later.
“	1895	“	May 1..	“ 6..	3	Aug. 19..	12	18.0	.....	.....	.....	.....	.....
Ray State	1894	Currie.....	“ 18..	“ 11..	3	.....	17	19.0	8 $\frac{1}{2}$	2	6	Dark yellow....	A strong grower; turban shaped, rough skinned; late.
Boston Marrow	1894	Thorburn ..	April 23..	“ 11..	3	Aug. 23..	15	26.12	9 $\frac{1}{4}$	1 $\frac{1}{2}$	6 $\frac{1}{2}$	Bright yellow...	A weak grower; ovate, ribbed; early.
“	1895	“	May 1..	“ 6..	3	July 31..	19	19.0	.....	.....	.....	.....	Deep pink; turnip shaped.
Brazil Sugar	1894	“	April 23..	“ 11..	1	.....	7	39.0	11 $\frac{3}{4}$	1 $\frac{3}{4}$	8 $\frac{3}{4}$	Cream	Long, yellow, striped green half way up from stem.
“	1895	Johns & Stokes.	May 1..	“ 6..	2	Aug. 18..	32	24.0	.....	.....	.....	.....	Long, ribbed green; about ten inches through.
Buckbee's New Sandwich Isl'd	1895	Buckbee....	“ 1..	“ 6..	3	Sept. 6..	15	45.4	.....	.....	.....	.....	Vine a moderate grower; smooth greenish black; fairly early; productive.
Canada Crookneck	1894	Thorburn ..	April 23..	“ 11..	3	Aug. 13..	41	11.0	6	3 $\frac{3}{4}$	4 $\frac{1}{4}$	Bright yellow...	Vine a free grower; cocoanut shaped; very prolific; mod. early.
“	1895	“	May 1..	“ 11..	3	“ 2..	29	16.0	.....	.....	.....	.....	.....
Cocoanut	1894	“	April 23..	“ 11..	3	“ 23..	67	3.1	4 $\frac{3}{4}$	1	3	Light yellow....	Vine of strictly bush habit; prolific.
“	1895	“	May 1..	“ 6..	3	.....	.....	.....	.....	.....	.....	.....	Vine of strictly bush habit; productive.
Cocozell Bush	1894	“	April 23..	“ 11..	3	Aug. 28..	19	14.4	5	1 $\frac{1}{4}$	3	Yellowish white.	Fruit long green striped with yellow.
“	1895	“	May 1..	“ 6..	3	July 18..	18	12.8	.....	.....	.....	.....	Fruit long green striped with yellow.
Cook's Favourite	1895	Dreer	“ 18..	“ 6..	3	“ 18..	9	23.4	.....	.....	.....	.....	Fruit dark pink, egg shaped; a good cooking variety.
Essex Hybrid	1894	Thorburn ..	April 23..	“ 11..	3	Aug. 6..	18	35.12	12 $\frac{3}{4}$	2 $\frac{3}{4}$	6 $\frac{1}{4}$	Bright yellow ..	Resembles Turban quite closely.
“	1895	“	May 1..	“ 6..	3	“ 2..	11	29.8	.....	.....	.....	.....	Fruit dark pink, large round to flat.
Early White Scallop	1894	“	April 23..	“ 11..	3	July 27..	47	11.2	9 $\frac{3}{4}$	2 $\frac{1}{4}$	5 $\frac{1}{2}$	White.....	Vine half bush; fruit half turban shaped; early; productive.
“	1895	“	May 1..	“ 6..	3	“ 18..	23	11.8	.....	.....	.....	.....	Fruit white, flat scalloped; a good early table variety.
Early Golden Bush	1894	“	April 23..	“ 11..	3	“ 21..	35	5.8	7	1 $\frac{3}{4}$	3 $\frac{1}{2}$	Light yellow ...	A true bush variety, suitable for garden culture.
“	1895	“	May 1..	“ 6..	3	“ 15..	30	5.0	.....	.....	.....	.....	Fruit deep orange, scalloped, of medium size.

Extra Early Orange Marrow.	1894	"	....	April 23..	"	11..	3	"	21..	16	24·0	9½	1¾	3½	O·orange yellow..	Makes few runners; early but unproductive.
"	1895	"	....	May	"	6..	3	Aug.	2..	17	37·0	....	....	....	3½	Fruit deep orange, large, roundish oval in form.
Egg Plant, Bush	1894	"	....	April 23..	"	11..	3	July	28..	9	29·4	8¾	1½	6¼	White	Fruit smooth, large; late.
"	1895	"	....	May	"	6..	3	Aug.	24.	16	35·4	....	....	....	....	Fruit green, turns yellow when ripe, oblong shaped; not bush, runs freely.
English Vegetable Marrow..	1894	"	....	April 23..	"	11..	3	July	28..	44	21·0	....	....	....	....	Vine free grower; fruit oblong; early, productive.
"	1894	Steele	..	"	18..	11..	3	July	28..	28	44·0	8	2¼	4¼	Cream	A well known variety in England; medium.
"	1895	Thorburn	..	May	1..	6..	3	Aug.	2.	43	14·12	....	....	....	....	do
Early Sugar	1895	"	....	"	1..	6..	3	Aug.	28..	41	22·8	....	....	....	....	Fruit dark orange, round like a small pumpkin.
Faxon	1894	"	....	April 23..	"	11..	3	"	6..	21	19·8	9	1½	6	Bright yellow..	Vine strong grower; fruit small, oblate, orange; late.
"	1895	"	....	May	1..	6..	3	"	17..	15	12·8	....	....	....	....	Fruit creamy green, round to flat, variable in colour.
French Olive	1894	"	....	April 23..	"	11..	3	Sept.	7	14	25·0	7½	1¾	5	Deep yellow....	Vine strong grower, many runners; fruit medium size; late.
"	1895	"	....	May	1..	6..	3	"	4..	9	30·4	....	....	....	....	Fruit long green; late.
Fordhook	1895	"	....	"	1..	6..	3	Aug.	26..	39	5·8	....	....	....	....	Fruit light yellow, about 10 inches long, ribbed, tapering to both ends.
Giant Summer Crookneck...	1894	"	....	April 23..	"	11..	3	July	21..	27	7·8	4	¾	2½	Light yellow....	Weak grower; fruit small, crooked, yellow; early, prolific.
"	1895	"	....	May	1..	6..	3	"	18.	29	10·12	....	....	....	....	Fruit orange, long crook-necked and corrugated.
Golden Custard Bush	1894	"	....	April 23..	"	11..	6	"	21..	88	11·0	11¼	3¼	4¾	White	Deep yellow, scalloped and incurved; early, productive.
"	1895	"	....	May	1..	6..	3	"	15..	24	19·0	....	....	....	....	Fruit deep yellow, flat and scalloped.
Hubbard	1894	"	....	April 23..	"	11..	5	Aug.	27..	30	28·12	11	2	7	Yellow	Indispensable for winter use; reliable.
"	1895	"	....	May	1..	6..	3	"	28..	16	31·0	....	....	....	....	A well known variety; fruit green, oval shaped; late.
Italian Vegetable Marrow...	1894	"	....	April 23..	"	11..	3	July	28..	24	14·0	6½	1¼	4	Cream yellow...	A bush variety; late.
"	1895	"	....	May	1..	6..	3	"	18..	19	14·8	....	....	....	....	Fruit oblong, green striped with yellow.
Japan Red Turban	1894	"	....	April 23..	"	11..	3	"	28..	35	7·12	7¼	1	5¼	Pale yellow....	Makes but few runners; fruit strongly ribbed.
"	1895	"	....	May	1..	6..	3	Aug.	2..	35	9·4	....	....	....	....	Fruit red, flat or round.
Jumbo	1894	Steele	.....	"	5..	11..	2	"	14..	10	144·8	21¾	2¾	16	Light yellow....	Strong grower, field pumpkin type; late.
Livingston's Pie	1895	Ewing	.....	"	5..	6..	3	"	28..	9	21·0	....	....	....	....	Fruit yellow, resembles a large musk melon; excellent for pies.
Low's Bay State	1894	Thorburn	..	April 4..	"	11..	3	"	13..	18	27·0	10½	2½	6½	Bright orange...	Vine strong grower; med. early; not prolific.

TEST OF SQUASHES, 1894-95.—*Concluded.*

Variety.	When tested.	Seedsman.	Date of Sowing.	Date of Planting out.	No. of Hills Planted.	When ready for use.	No. Matured before Frost.	Weight of two Specimens—lbs., ozs.	Transverse—diameter.	Depth of Flesh.	Size of Cavity—diameter.	Colour of Flesh.	General Remarks.
Low's Bay State.....	1895	Thorburn...	May 1..	April 6..	3	Aug. 27..	13	23·4	in.	in.	in.	.....	Fruit slate colour, round to flat, large.
Long White Bush Marrow ..	1894	Steele	" 5..	" 11..	3	" 6..	20	19·4	5 $\frac{1}{4}$	1 $\frac{1}{4}$	3 $\frac{1}{4}$	White	Bush in habit of growth, oblong; early and prolific.
Large Pumpkin from W. J. Kerr.	1895	.....	" 1..	" 5..	3	" 18..	26	52·4	.....	.....	.....	.....	Fruit orange yellow, oval shaped very large, mammoth type.
Mammoth Chili, Pumpkin...	1894	Thorb.....	April 23..	June 11..	3	Aug. 8..	10	79·12	16 $\frac{1}{2}$	2 $\frac{1}{4}$	12 $\frac{1}{2}$	Orange yellow..	Long runners, variable orange yellow and mottled, mixed.
"	1895	"	May 1..	" 5..	3	" 18..	16	105·12	.....	.....	.....	.....	Fruit light yellow, large, oval
Mammoth White Bush.....	1894	"	April 23..	" 5..	3	July 21..	28	6·0	8 $\frac{1}{2}$	2 $\frac{3}{4}$	4 $\frac{1}{2}$	Creamy white...	Moderate grower; fruit, yellow, flat, deeply scalloped, early productive.
Mammoth Whale.....	1894	Child.....	" 23..	" 5..	3	Aug. 19..	12	98·0	17 $\frac{1}{2}$	2 $\frac{3}{4}$	12 $\frac{1}{4}$	Cream	Strong growing variety of pumpkin type, fairly early.
"	1895	"	May 1..	" 5..	3	Sept. 15..	21	84·8	.....	.....	.....	.....	Fruit long green, when ripe looks like rough sand stone.
Mammoth King.. ..	1894	Steele ..	" 18..	" 5..	2	" 8..	3	55·0	12	2	8	Orange.	
Metcalf.....	1895	Child.	" 1..	" 5..	3	Aug. 8..	7	9·0	.....	.....	.....	.....	Fruit deep orange, round to oval; did not do very well.
New Pine Apple.....	1894	Thorb.....	April 23..	" 5	3	July 28..	38	13·0	6 $\frac{1}{2}$	1 $\frac{1}{4}$	3 $\frac{1}{4}$	White... ..	Vine a rampant grower, very early, productive, good.
"	1895	"	May 1..	" 5..	3	Aug. 9..	37	16·0	.....	.....	.....	.....	Fruit, white, scalloped or pine, apple shaped, a good table variety.
New Marblehead.....	1894	"	April 23..	" 5..	3	Sept. 4..	19	21·12	8 $\frac{1}{4}$	1 $\frac{1}{4}$	6	Pale yellow....	Strong grower, moderately productive but late.
"	1895	"	May 1..	" 5..	3	Aug. 27..	13	23·12	.....	.....	.....	.....	Fruit, light slate colour, egg shaped without ribs.
New Long Bush or Cocozelle.	1894	Rennie.	" 1..	" 5..	2	" 18..	71	8·0	..	.....	.....	.....	Fruit, cream colour, short oval, a strong running variety, not well selected.
Perfect Gem.....	1894	"	April 23..	" 5..	6	" 27..	115	5·6	5 $\frac{1}{2}$	1 $\frac{1}{4}$	3 $\frac{1}{2}$	White.....	Vine, a very rank grower, remarkably productive, valuable.
"	1895	Thorb.....	May 1..	" 5..	3	" 2..	101	3·9 $\frac{1}{2}$	.....	.....	.....	.....	Fruit, creamy white, a small round nutted variety, good for baking.

Red China.....	1894	Thorburn...	April 23..	June	5..	3	July	28..	28	10·8	8	1½	5½	Bright Yellow..	Identical with Japan Red Turban.
“.....	1895	“.....	May 1..	“	5..	3	Aug.	2..	32	9·0	13½	2¼	9¼	Greenish Yellow	Fruit, the same as Japan Turban.
Salem Valparaiso.....	1894	“.....	April 23.	“	5..	3	“	4..	13	83·8	.....	.....	.....	.....	Vine, strong fine grower. Pumpkin type.
“.....	1895	Currie... ..	May 1..	“	5..	3	Sept.	6..	17	113·12	.....	.....	.....	.....	Fruit, light yellow, very large, nearly round, ribbed.
Summer Crookneck.....	1894	“.....	April 23..	“	5..	3	July	25..	27	7·8	4	½	3	Pale Yellow....	Moderate grower, very prolific, rather late.
“.....	1895	Thorb.....	May 1..	“	5..	3	“	18..	50	7·12	.....	.....	.....	.....	Fruit, orange, long crooknecked and warted.
Summer Crookneck, long green striped.....	1894	“.....	April 23..	“	5..	3	Aug.	14..	41	8·8	4½	1	2¾	White... ..	Fruit, green crooknecked, warted a late variety.
Summer Crookneck, long green striped.....	1895	“.....	May 1..	“	5..	3	“	18..	52	12·0	.....	.....	.....	.....	Vine, a fair grower, turban shaped, black turning orange, late.
Sugar Pumpkin.....	1894	Steele.....	“ 13..	“	5..	2	Sept.	20..	31	18·4	9½	1¼	7¼	Orange.....	Fruit, white scalloped and flat.
Silver custard.....	1895	Thorb.....	“ 1..	“	5..	3	July	18..	33	10·8	.....	.....	.....	.....	An old standard, summer and autumn variety.
Turban.....	1894	“.....	April 23..	“	5..	3	Aug.	6..	12	39·12	10	2¼	6¼	Bright Yellow..	Fruit, deep pink, large round or flat, the same as Warren.
“.....	1895	“.....	May 1..	“	5..	3	“	8..	19	41·0	.....	.....	.....	.....	Vine a fair grower, moderately early, productive.
Warren.....	1894	“.....	April 23..	“	5..	3	“	13..	14	30·0	9¾	2¼	7½	“	Fruit, deep pink, large, round or flat.
“.....	1895	“.....	May 1..	“	5..	3	“	9..	19	29·8	.....	.....	.....	.....	Vine, moderate grower, large crookneck, black, green or marbled, late.
Winter Crookneck.....	1894	“.....	April 23..	“	5..	3	“	27..	16	29·2	8½	1¼	6½	Green Orange...	Strong grower, medium size, rough, late.
White Chestnut.....	1894	“.....	“ 23..	“	5..	3	“	8..	13	20·8	8½	1¼	6	Green Yellow...	Fruit, white oval or round.
“.....	1895	“.....	May 1..	“	5..	3	“	19..	13	20·12	.....	.....	.....	.....	Fruit, cream, white from 7 to 8 inches long, warted.
Der Wing.....	1895	“.....	“ 1..	“	5..	3	“	15..	38	3·4	.....	.....	.....	.....	Fruit, deep pink turnip shaped, very early.
Dunlap's Early.....	1895	Gregy.....	“ 1..	“	5..	3	July	18..	11	18·0	.....	.....	.....	.....	Fruit, dark green, round to flat, rough and netted.
New Yokohama.....	1895	Joh'sn&Stok	“ 1..	“	5..	2	Sept.	6..	18	26·8	.....	.....	.....	.....	Fruit, white, egg shaped.
Sweet Potato Pumpkin ..	1895	Thorb.....	“ 1..	“	5..	3	Aug.	18..	13	18·0	.....	.....	.....	.....	Fruit, white, large, oblate or round.
Sweet Nut	1895	Dreer.....	“ 1..	“	5..	3	“	18..	23	20·0	.....	.....	.....	.....	Fruit, deep orange, long crooknecked and warted.
Sticklers Summer.....	1895	Gregy.....	“ 1..	“	5..	3	July	18..	32	12·0	.....	.....	.....	.....	Fruit, light yellow, small, nearly round.
Pen-y-Byd.....	1895	Ewing.....	“ 1..	“	5..	3	Aug.	18..	50	12·12	.....	.....	.....	.....	Fruit, light slate color, oblong.
Pikes Peak.....	1895	Thorb.....	“ 1..	“	5..	2	Sept.	6..	13	20·4	.....	.....	.....	.....

VARIETIES RECOMMENDED.

Early Golden Bush.—This ripened fruit in from five to six weeks after setting. It occupies a small amount of space and is very productive.

English Vegetable Marrow.—Ripened in six to seven weeks after setting out. Productive: much prized for table use.

New Pine Apple.—This is an interesting early productive variety, requiring as much room as the Vegetable Marrow. The fruit is nearly flat and scalloped at base, but sharply conical, and considerably elongated towards the opposite end. Useful as well as curious.

Perfect Gem.—Vine a very strong grower, exceedingly productive. Fruit, small, round, about the size of a cocoanut, ribbed fleshy with small cavity, medium early. This is much valued as a baking squash by those who have tried it in this way. Halved and baked in a quick oven it approaches in flavour nicely cooked sweet potatoes.

Among others which have been commended for pies by those who have tried them, are *Cook's Favourite*, *Giant Summer Crookneck*, *Essex Hybrid*, *Dunlaps Early*, *Sweet Potato Pumpkin* and *Pen-y-byd*.

Of winter varieties, *Hubbard*, a well-known sort, it is safe to say, still takes the lead, although *Bay State* gives promise of being a useful variety.

Butman.—Proved to be a keeping variety of some merit.

TOBACCO.

Experiments with this crop have been continued each year since the work was commenced in 1893.

In accordance with results gained the first season the plants have always been transplanted in the hot-bed previous to setting in open ground. The plants were set out on June 5th. The soil was a gravelly loam, dressed with 30 loads of barn-yard manure per acre the previous year.

The plants were set in rows 3 x 4 feet apart. The ground was cultivated frequently with a Planet, Jr., cultivator, as long as it was possible to pass it between the rows, without injuring the leaves. The plants were "topped" and "suckered" as often as seemed necessary, and were harvested by the "single leaf method" between the 17th and 25th of September. The leaves were, at harvesting, separated into two grades, according to size and quality—that is colouring and freedom from injury. After drying for two months in a loft, where the conditions were not as suitable as could be desired, the leaves were again sorted and tied up in "hands." Three grades were made this time, according to size, colouring and soundness. In the tabular statement which follows, particulars regarding the yield of the different varieties are submitted. It will be noted that the estimated yields of green leaf are somewhat larger than in 1893, and that the dried leaf very much exceeds in weight the previous records. The latter fact may partly be accounted for by stating that the humid condition of the atmosphere prevailing through the autumn months prevented the leaves losing as much moisture as they otherwise would under ordinary atmospheric conditions. The quality of the leaf was better, as a rule, than in former years.

Tobacco, 1895.	Seedsman.	Date of Sowing.	Date of Transplanting in Hot Bed.	Date of Planting out.	Number Planted out.	Date of Gathering.	Number of Plants Gathered of.	Weight of First Grade Green.		Weight of Second Grade Green.		Weight of First Grade when made into hands.		Weight of Second Grade in hands.		Weight of Third Grade in hands.		Estimated Weight per acre, Green.		Estimated Weight per acre, dry.	
								lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
Big Boston.....	Evans..	April 5.	May 17.	June 5.	25	Sep. 23.	25	43	0	24	8	10	0	2	8	4	8	9,801	8	2,408	8
Canadian.....	"	"	"	"	98	"	95	142	8	70	0	8	12	24	8	14	8	8,100	8	1,834	8
Cannelle.....	"	"	"	"	70	"	69	63	0	44	8	7	0	3	8	4	0	5,629	0	789	0
Connecticut Seed Leaf.....	"	"	"	"	102	"	101	382	0	86	10	51	0	19	0	16	0	16,988	0	3,091	0
Climax.....	Thorb..	"	"	"	159	"	144	423	8	122	8	80	8	26	0	31	12	13,440	12	3,479	12
Gold Leaved.....	Evans..	"	"	"	91	"	88	126	8	68	8	15	0	19	4	20	4	8,002	4	2,269	4
Hester.....	"	"	"	"	24	"	23	58	0	12	8	8	8	5	8	2	12	10,965	12	2,683	12
Hartford (15).....	"	"	"	"	108	"	106	358	8	98	8	64	8	8	12	26	4	15,648	4	3,424	4
Maryland.....	"	"	"	"	68	"	65	150	8	50	8	27	12	6	1	11	8	11,169	8	2,513	8
Sterling.....	"	"	"	"	151	"	140	229	8	75	8	36	8	23	5	15	4	7,908	4	1,944	4
White Burley.....	"	"	"	"	85	"	82	341	0	155	4	49	8	18	8	9	0	21,957	0	3,367	0
Yellow Pryor.....	"	"	"	"	105	"	103	256	0	81	8	29	0	15	1	17	0	11,877	0	2,109	0
Penn. Seed Leaf.....	Thorb..	"	"	"	135	"	130	493	8	97	8	62	0	20	0	11	0	16,503	0	2,597	0
Yellow Mammoth.....	"	"	"	"	40	"	40	158	8	46	8	33	0	7	0	5	8	18,604	8	4,174	8
Sweet Oronoko.....	Ragland	"	"	"	43	"	43	95	4	41	0	17	12	3	4	8	0	11,480	0	2,448	0
Virginia Oak Hill.....	Thorb..	"	"	"	85	"	82	211	0	63	0	48	4	3	4	14	0	12,154	0	2,922	0

Made into hands from the 26th Nov. to 11th Dec.

In order to gain a manufacturer's opinion of the special values and qualities of these tobaccos, 3-pound samples of the following varieties were submitted to Mr. J. M. Fortier, tobacconist, of Montreal, who made them up into the class of goods for which he deemed them best fitted. His report is as follows :—

REPORT of J. M. Fortier on Tobacco grown on the Experimental Farm, 1894, to the Horticulturist, Ottawa, Ont.

Name of Varieties.	Adapted for.	Amount manufactured.
Honduras.....	Chewing ; this variety does not burn.....	3
Muscat de Perse.....	Cut smoking, cigarettes.....	
Sumatra.....	No good now ; poorly cured ; leaf small.....	
Penn. Seed Leaf.....	Cigars, fair quality.....	3
Stirling.....	Plug smoking.....	2
Tennessee, red.....	Cut smoking.....	6
Canadian (Evans).....	Chewing plug, honey.....	5
Quesnel or Cannelle.....	Cut smoking, very fine for pipe and smoking plug.....	
Connecticut Seed Leaf.....	Cigars.....	
Brazilian.....	Cigarettes.....	
Safrano.....	Cigarettes.....	6
Pryor, Yellow.....	Plug, bright, smoking.....	3
Pryor, Blue.....	Cut, smoking.....	3
Hestor.....	Navy chewing.....	3
Oronoko, White stem.....	Navy chewing.....	3
Oronoko, yellow.....	Honey chewing.....	
Havana Vuelta Abajo.....	Cigars, fillers and cut for pipe smoking ; seconds ; third crop may become better.....	
Imperial Havana Partidas...	Bitter and requires to be fermented for cigars.....	
Persian Muscatellar.....	Cut tobacco ; poor.....	2
White Burley.....	Plug, smoking ; yellow ; cigarettes, good all round ; best paying.....	3
Tackahoe.....	Navy chewing.....	
Virginia Oak.....	Cigarettes.....	1½
Yellow Mammoth.....	Mild cigarettes ; good ; plug and pipe smoking.....	2½
Climax.....	Plug smoking, same as White Burley, only superior in aroma...	
Persian Rose.....	No use for smoking, poor aroma ; good for chewing.....	

In looking over the above report, it is seen that the collection of varieties may be sub-divided according to the form of the manufactured product for which they seem best fitted.

CIGARS.	SMOKING.
Pennsylvania seed leaf.	Quesnel (Cannelle):
Connectient seed leaf.	Pryor yellow.
	White Burley.
	Climax.
CHEWING.	CIGARETTES.
Canadian.	Brazilian.
Oronoko White.	Safrano.
“ Yellow	
Yellow mammoth.	

The yield of the dried leaf of these varieties in 1893 was as follows :

Variety.	Estimated yield per acre, lbs.
Brazilian.....	1,107
Climax.....	1,636
Canadian.....	1,004
Connecticut Seed Leaf.....	1,826
Oronoko White Stem.....	1,185
“ Yellow “.....	1,386
Pennsylvania Seed Leaf.....	1,736
Pryor Yellow.....	1,165
Safrano.....	1,747
White Burley.....	1,468
Yellow Mammoth.....	1,676
Quesnel.....	648

REMARKS.

Conn. Seed Leaf, Penn. Seed Leaf, Yellow Mammoth and Climax require careful handling here and in similar localities in order to bring them to maturity before autumn frosts. They should be started early in the spring in the hot-bed and transplanted in cold frames before setting out in the field. It is better to transplant on the late side than run the risk of injury by cold rains or low temperature.

Samples of dried leaf received from British Columbia have been of a high degree of excellence, showing good burning qualities. It would seem reasonable to suppose that it could be grown with success upon the more elevated plateaux when the summer heat is sufficient to bring it to maturity in full possession of its essential qualities.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST.

(JAMES FLETCHER, F.R.S.C., F.L.S.)

W. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially under my notice during the past season. In addition to those matters mentioned in the report there are many others which have either been already treated of at some length in previous reports or concerning which further investigation is necessary. The greater part of the inquiries during the past season, as has been the case in previous years, referred to insect injuries to fruits. Some of the well-known pests have appeared in unusual numbers in certain localities or have extended their previously recorded range. The Diamond-back Moth (*Plutella cruciferarum*, Zell.) was very abundant from Manitoba westward to the Pacific coast, occurring upon all cruciferous plants grown as crops, particularly turnips and cabbages, and also on many weeds belonging to the same family of plants. Cut-worms of two or three kinds gave trouble in Ontario and Manitoba; but inquiries on these injuries were this year fewer than usual. The Amputating Brocade Moth (*Hadena arctica*, Boisd.) occurred in the perfect form in enormous numbers in western Ontario, and many specimens were sent in for identification. The same thing was the case with the Clandestine Owlet Moth (*Agrotis clandestina*, Harris), in Manitoba and the North-west Territories as far west as Calgary.

The Cabbage and Turnip Aphis (*A. brassicæ*, Bouché) was abundant and injurious on cabbages in gardens in Victoria, B.C., on turnips in Ontario, Nova Scotia, and Prince Edward Island. The injuries, as far as I could obtain specimens, seemed all to be due to the same species. It is difficult to treat this insect in field crops, but much may be done by watching carefully in August when hoeing turnips, and by destroying all colonies found. At that time the colonies are generally small and few in number. On cabbages in gardens kerosene emulsion or tobacco wash may be used.

The black aphid of the horse bean was sent from Nappan, Nova Scotia, where it was sufficiently abundant to completely kill the beans in spots. Specimens of the aphid were sent to Prof. T. A. Williams, of South Dakota, for identification, and he replied:—"The bean lice are what has passed in America for *Aphis medicaginis*, Koch; I am not yet sure that our insect is identical with the European species, but it is quite likely to be so."

A rather severe outbreak of the Carrot-fly (*Psila rosæ*, Fab.), a very rare attack in Canada, occurred at Rothesay, N.B., and Mr. J. S. Armstrong gives some interesting data as to the immunity from injury of some late-sown carrots.

The two attacks most often mentioned by correspondents in the Maritime Provinces were of the Colorado Potato Beetle (*Doryphora 10-lineata*, Say) and the Horn-fly. It is satisfactory to learn of the general adoption both in Nova Scotia and Prince Edward Island, of the only practical remedy, viz., Paris green poisoning, for the former. The Rev. Father Burke, of Alberton, P.E.I., writes as follows:—

"November 10.—Potato Bug, Colorado Beetle.—As soon as the frost left the ground, great numbers of old beetles began to move about in their energetic way, all over the country. The wooden sidewalks of our towns and villages were literally swarming with them. Everybody began to fear for the potato crop, and, for the first time, a

general conviction forced itself upon the growers that they would have to be fought tooth and nail this year. The early season was dry, and the potato vine was scarcely up when the clusters of yellow eggs were everywhere discernible. Indeed, eggs were laid on blades of grass and everywhere. The general recourse was to Paris green; we were lucky in getting a fairly pure article. The havoc was fearful. Some farmers who still fear the Paris green, and a number of gullible people, bought "bug catchers" from enterprising agents. Of course, these people lost their time and money. A few applications of Paris green, however, thinned out the bug army very effectually. Towards the end of July we had copious rains. As you know, vegetation is very rapid here. The vines soon pushed forth such a growth that the few bugs left were not able to do any damage. We have had a grand crop of potatoes throughout the whole province—large and fine-looking and of superior quality."

The Horn-fly (*Hæmatobia serrata*, Rob.-Desv.) is now at its worst in Nova Scotia and Prince Edward Island. Father Burke says:—

"The Horn-fly appeared early in June this year, and soon so multiplied as to be a constant torment to cattle. All kind of oiling, spraying, etc., seemed almost useless. In August the milk supply was much reduced all over the country. Reliable dairymen computed their loss at 50 per cent. This fly also gave in many places much annoyance to horses, attacking them in the same way as the cows. Farmers used codfish oil, castorine, machine oil, emulsion of kerosene—anything they could get. The emulsion had little effect. Many must have injured their cows by daubing them with thick crude petroleum and castorine."

There is every reason to anticipate that the experience of the farmers in the Maritime Provinces will be the same as in all other parts of Canada, namely, that by the third year the Horn-fly attacks decrease in virulence and by four or five years they are hardly noticeable.

A new attack of much interest was widespread in pastures on Cape Breton Island last season. This was by the Cottonty Grass-scale (*Eriopeltis festucae*, Fonsc.). Little is known of the habits or extent of possible injuries by this insect; but as it winters on the old grass, firing this grass in winter or early spring would probably be an easy means of keeping the insect within due limits.

The subject of weeds has taken up much of my time during the year. Two weeds of special importance in the west are treated of and figured in the body of the report; but much other information is preserved for future publication in bulletin form.

As in the past, whenever my official duties would permit of my absence from Ottawa, every opportunity has been embraced of attending and delivering addresses at meetings of farmers and horticulturists. In this way, information has been given on many subjects coming within the scope of my department, and the utility of the department itself has been made known more widely.

By instruction of the Honourable Minister of Agriculture, I had the great advantage of visiting Manitoba, the North-west Territories and British Columbia during the past summer: this journey was of very great use to me in my work, and I trust may prove to be also to the various places visited. Large collections of plants, seeds and insects were secured in addition to the observations and notes which were made.

I have again gratefully to acknowledge much assistance from the specialists in Canada, the United States and Europe, whose names will be mentioned under the subjects which have been referred to them. Especial thanks are due to the United States Entomologist, Mr. L. O. Howard, and his staff for many favours, and to Prof. John Macoun and Mr. J. M. Macoun for assistance on very many occasions in identifying difficult plants.

Above all I wish publicly to acknowledge the great help I have received in all branches of my work from my assistant, Mr. J. A. Guignard, B.A., who by his assiduous attention has done very much to bring the department of the Entomologist and Botanist to such degree of efficiency as it has attained.

I am, sir,

Your obedient servant,

J. FLETCHER.

CEREALS.

Notwithstanding the prolonged drought which this year prevailed throughout the greater part of the grain growing districts of Ontario, Quebec and the Maritime Provinces, the crop of the whole Dominion is an enormous one and has been saved in good condition.

Wheat and oats in Manitoba and the North-west are the heaviest crops in the history of the country.

In referring to the slight damage by frost in the *Manitoba Crop Bulletin* No. 45, Dec. 10th, 1895, it is stated:—"The thermometer on the night of August 19 indicated a few degrees of frost in different parts of the province west of the Red River Valley. Damage is reported by some correspondents as "slight," by others as more serious. A more general cause of loss is reported to be the prevalence of smut. This is much to be regretted, as it is generally admitted that a preventive can be used." Of the subjects belonging to my department affecting grain crops in Manitoba, smut is the only one requiring mention. See page 141.

In the *Ontario Crop Bulletin*, November, 1895, it is stated:—"Oats: this is the big crop of the year. Increased acreage and the high average yield of 35.7 bushels per acre have given a total of 84,697,566 bushels for 1895."

In the *Nova Scotia Government Crop Report* for November, we find:—"No complaints of rust or other troubles have been made, so that we must conclude that, drought notwithstanding, the oat crop must have come nearly up to the expectations of the growers."

The reports received here of injuries to the grain crops have been usually few during the year. The HESSIAN FLY has only been sent in from two widely separated localities, one in North Ontario, the other in Prince Edward Island, where, however, it is stated by Mr. N. McPhee, of Heatherdale, that although the crop this year was only slightly affected, Russian wheat has been almost a total failure for the last few years owing to its depredations. The WHEAT MIDGE, which for many years caused the largest amount of injury to small grains in all parts of Eastern Canada, was not this year mentioned at all by correspondents, the only notice of it that I have seen being in the *Nova Scotia Crop Report* for November, 1895, where it is stated that it has entirely disappeared in one section. Specimens required for experiments were not obtainable in the Ottawa district nor in Manitoba, the North-west, nor British Columbia. A rather serious outbreak of the Joint-worm on wheat at Meaford, Ontario, is treated of at some length later.

The GRAIN PLANT-LOUSE (*Siphonophora avenæ*, Fab.) occurred more or less numerously on wheat, oats and rye in almost every province of the Dominion, and the fact may be pointed out that, although attacking oats in Nova Scotia and New Brunswick, it was particularly noticed that there was no occurrence this year of the curious disease spoken of in previous reports as "Red Leaf" of oats, which some had thought was caused by the attacks of this insect. It was noticed in some abundance at Agassiz, British Columbia, and on Vancouver Island; but, as is nearly always the case, its presence affected the yield very little, on account of its being in every instance kept well in check by parasites. A sample of infested oats sent by Mr. Wm. Bartlett, from Inholmes, Ontario, in the Muskoka district, had nearly every specimen of the plant-lice parasitized by a small Braconid, which Mr. L. O. Howard has identified for me as *Aphidius obscuripes*. About the middle of June Prof. J. H. Panton, of Guelph, reported damage to oat fields near Paisley and Fullarton, Ontario, by the GLASSY CUT-WORM (*Hadena devastatrix*, Brace). This caterpillar is frequently injurious to fall wheat and grasses of many kinds. The caterpillar is of a dirty greenish white with a reddish head and has on its body several small bristle-bearing warts arranged over the surface in the position usually found in this family of insects.

The PEA MOTH, treated of in my last report, still continues its ravages unchecked. I regret to say that so far every one has failed in breeding this pest, so that its identity is still in doubt, and no suggestions of practical value have been made as to remedies. Complaints of injury from Prince Edward Island to Manitoba have been received; the seeds of many wild members of the pea family in the woods were also found to be much attacked wherever examined, notably those of *Lathyrus venosus* at Brandon, Man., about half a gallon of pods giving only half a small tea-cupful of seed.



Fig. 1.—The Pea Weevil.

The PEA WEEVIL (*Bruchus pisi*, L.) is still very abundant, judging from samples of tested pease returned to the Experimental Farm, but it has seldom been mentioned in correspondence. On the whole, perhaps it has been slightly less destructive this year than last, although one correspondent writes from Prince Edward county, Ont. :—"Since the introduction of United States pease supplied by the seed companies, the weevil has been more plentiful in this country

and is increasing, notwithstanding the efforts made by the companies." This increase, however, is not enough to affect the crop to any great extent. There is no doubt that the Pea Weevil has now become so established in some parts of Southern Ontario that it will take considerable time to reduce its numbers perceptibly. As, however, its habits are so well known, and, as by far the greater number of the beetles pass the winter inside the seed, there is no doubt that a great deal more might be done by the farmers and small growers, in either treating their seed before sowing or holding it over in tightly closed vessels or bags till the second year. From all I can learn, those merchants who do business on a large scale, systematically disinfect their seed before sending it out, with bisulphide of carbon. The injury to the crop is done by grubs from eggs laid by weevils which had either left the pease in the autumn and had wintered about barns or other buildings, or else from pease saved for seed in small quantities by farmers who took no steps to destroy the weevil before sowing time.

THE JOINT-WORM.

(*Isosoma hordei*, Harris.)

At the end of June, stems of fall wheat were received from Mr. Thomas Harris, of Meaford, Ont., on the Georgian Bay, bearing the galls of a Joint-worm, closely resembling those figured (Fig. 2), except that, where they occurred on the stem, in almost every instance it was bent abruptly at a right angle, away from the side of the stem

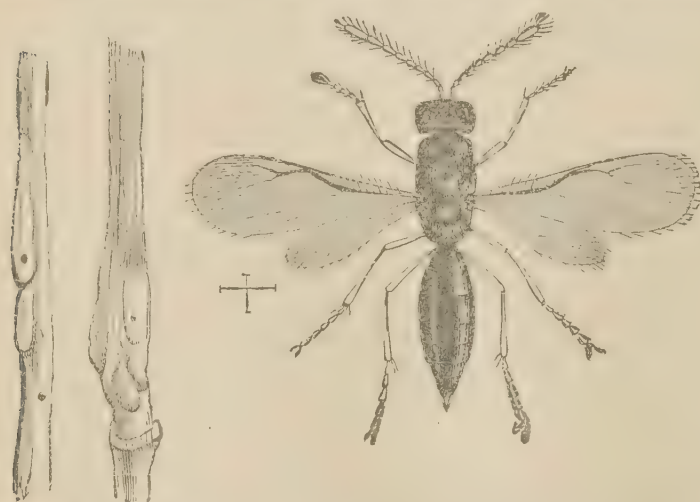


Fig. 2.—The Joint-worm : galls on wheat stems, natural size ; fly, enlarged.

where the gall occurred. Although the perfect insect of the Joint-worm (Fig. 2), which is a tiny black fly only about $\frac{1}{10}$ of an inch in length with clear transparent wings and pale legs, is by no means rare in some parts of Canada, where collections of insects have been made, its injuries to crops have been very rarely recorded or noticed. A very complete article, however, by the Rev. Dr. Bethune appeared in the *2nd Annual Report* of the Entomological Society of Ontario (1871). In this article, the insect and its habits are carefully described and mention is made of some excellent observations of Mr. Johnson Pettit, of Grimsby.

In Stoddart's *Encyclopædia Americana*, under the title "Agriculture," is a concise account of this insect by the late Dr. C. V. Riley, which reads as follows :—

"The Joint-worm (*Isosoma hordei*, Harr.). In years past the Joint-worm has done much damage to the wheat, oats, rye and barley crops of the more northern and eastern

states. It belongs to the only plant-feeding genus of the parasitic family *Chalcididae*. The eggs are laid near the base of the stalks of grain in the latter part of May or the first of June. The young larvæ form slight gall-like swellings of the stalks, in which they feed, dwarfing the stalk and reducing the yield. Most of the larvæ winter in the stalks, but a few transform and appear as flies in late fall. They are destroyed by the chalcid parasite (*Semiotellus chalcidiphagus*, Walsh). Remedy: It is obvious that burning the stubble after harvest will prove an effective remedy."

The injured straw sent in by Mr. Harris bore galls which were undoubtedly caused by the Joint-worm or a closely allied species of the same genus, although the galls do not quite agree with any of the descriptions I have been able to consult. The following information accompanied the specimens or was given in reply to inquiries:—

"Meaford, Ont., June 24.—I send you a sample of fall wheat affected (as I suppose) with Hessian Fly. This is the first time I have seen anything like it on my farm. The wheat was sown about the middle of September last, on pea stubble after sod; the ground was very clean and had borne no wheat crop for several years."

"July 27.—In reply to your inquiry as to the percentage of crop affected, since the crop has matured and is now cut, I would estimate the damage at about 5 per cent of the entire crop, although some spots seemed to be more affected than others. I have had no opportunity of investigating, but from conversation with other farmers I learn that it has appeared in other fields than my own. It is something quite new to me, as I have never observed anything just like it before. I have been on the watch for some years, expecting the Hessian Fly to make its appearance among us, and thought I had found it, when I sent you those specimens.* I now send you a fresh sample of the diseased heads and some of the sound heads from the same field selected on the same day, viz., 24th July, the day we cut the field of wheat. I thought it would be better to wait till the whole crop matured, so that I could form a better idea of the amount of damage done by this new pest."—THOMAS HARRIS.



Fig. 3.

Two parcels of injured wheat stems were received from Mr. Harris. In almost every instance, the galls which are conspicuous, elongated, irregular, many-celled excrescences, were situated at the very base of the topmost ear-bearing section of the stem, immediately above and in most cases also including the thickened joint.

The greater portion of the gall, which is about three-quarters of an inch in length by one-quarter of an inch at its widest part, is always above the joint in the tissue of the base of the leaf-sheath which becomes hard, woody and thick and presses so much on the stem inside it that this is squeezed and confined, and, therefore, can neither develop properly nor convey the necessary nourishment up to the forming grain. As a consequence, upon comparing the product of several ears from infested stems with those from uninjured ones, it was found that the grains of wheat had been reduced by about two-thirds, both in number and weight, from what they would have been.

A most interesting evidence of an effort made by the plant to repair the damage done by the Joint-worm, was the presence at the base of nearly every gall, of more or less developed true rootlets; these were usually 3 or 4 in number and varied in length from one-eighth of an inch to four and a half inches. In the case of the longer rootlets, these had run down close to the stem inside the sheath of the leaf immediately below the joint from which they sprang. From their development and their copious covering of root-hairs, these rootlets must have obtained considerable moisture and have helped materially in bringing the grain to maturity.

The cells in the galls vary in number from about 5 to 12, and there are sometimes, besides, 1 or 2 detached cells separated a short distance from the main body of the gall and further away from the joint. In rare instances the galls run down a little below the joint, and in such cases (in the specimens examined by me) these 2 or 3 cells are not

* As a matter of fact, there were a few specimens of Hessian Fly larvæ infesting the stems sent by Mr. Harris, but, as may be seen from Fig. 3 above, the brown flax-seed-like puparia lie outside the stem beneath the sheath of the leaf, not inside the tissues as in the case of the Joint-worm.

in the leaf sheath like those above the joint, but in the tissues of the culm or stem proper.

In addition to the above galls at the base of the topmost ear-bearing joint, there were also, on one or two of the stems sent, other similar galls at the base of the same stems, and in one specimen the gall formed a rosette of short aborted leaves about an inch long having the bases of each leaf hard and swollen and containing 2 or 3 cells. This was at the summit of a short stem not more than two inches from the ground.

Judging from the many published accounts of the Joint-worm, the nature and mode of occurrence of the galls vary somewhat; nearly all observers have described the galls as occurring on the lower joints of the wheat stem, close to the ground. In the wheat sent to me from Meaford, on the other hand, they were almost invariably at the topmost joint, although judging from what is known of the habits in other places, it is very probable that there were in the field many stems injured at the base, which were not noticed by Mr. Harris. Many writers describe the larval cells as being in the stem, whereas this was most exceptional in all the specimens examined by me, they were mostly in the sheathing leaf. The descriptions which agree best with my own observations, are by Dr. Harris in his "*Insects Injurious to Vegetation.*" He says:—"Dr. Fitch found the disease of the wheat-straw to be situated immediately above the lower joint, in the sheathing base of the leaf, the substance of which, for a distance exceeding half an inch, was much swollen and was changed to a more solid and wood-like texture, while the surface exhibited several long pale spots, slightly elevated like a blister. The hollow of the stem was entirely obliterated, at some parts, by the pressure of the enlarged portion of the sheath, and was hardly visible at others. Each of the blistered spots covered an elongated cavity containing a footless worm or maggot about one-tenth of an inch long. * * * Upon examining my samples, I found that the disease was not invariably confined to the sheathing base of the leaf, but that, in many cases, it was seated in the joint itself, the whole substance of which became enlarged and distorted. In a smaller number of cases it was found to occupy the culm or stem, above the joint, which was swollen so as to form an irregular gall-like tumour, while the leaf-sheath remained unaffected. These woody tumours have several little cells in them, varying in number from six to ten or more; and every cell contained an insect."

Prof. F. M. Webster, in his bulletin on "*Insects which burrow in the Stems of Wheat,*" April, 1892, says:—

"Speaking of the effect on wheat straw in Virginia, in 1851, Dr. Fitch says that they might be like an enlarged tumour, or only slightly elevated and blister-like. Prof. Cook found that the insect affected the straw in much the same modified way or perhaps still less prominently. The location of the larvæ in the straw may vary from the vicinity of the second joint, as recorded by Dr. Harris; in the sheath or lower portion of the stem, as recorded by Glover; or in the vicinity of every joint, except the uppermost, as observed by Cook." To the above record we may now add that it does occur abundantly above the uppermost joint.

So far as known, the Joint-worm is single brooded in Canada, the perfect flies appearing in June, galls being well formed by the end of the month, and, normally, the winter is passed in the larval condition.

Remedies.—Under this head I cannot do better than quote the following from Dr. J. A. Lintner's *Fourth Report*:—

"It is fortunate that we have at our command means for controlling the depredations of this insect, which are simple, easy and inexpensive.

"Since its entire life, from its hatching to its emerging in its perfect state, is passed within the straw and in quite a limited locality therein, it is evident that if the straw be destroyed by burning or by any other as effectual a method, at any time prior to the emerging of the winged insect, the entire brood will be destroyed with it.

"If the grain is not cut unusually close, a large proportion of the larvæ will be left in the stubble. The stubble of an infested field should be burned over at any convenient time favourable for the burning."

(This refers to the usual mode of occurrence of the galls close to the ground. To facilitate the operation of burning, a little dry straw may be scattered lightly over the stubble.—J. F.)

"It is believed that a deep ploughing-under of the infested stubble would be fatal to the contained larvæ, and almost as effective as burning. An ordinary ploughing was found ineffective in Massachusetts, as the insects, having only been buried to a moderate depth, completed their transformation and made their way to the surface.

"The broken-off, hardened pieces of the straw observed in threshing and cleaning, should be carefully collected and burned. The grain should also be examined for these pieces and picked out by hand.

(Sometimes no galls are formed, the presence of the larvæ causing merely slight swellings and a hardened thickened condition of the straw: these portions break off in threshing, and are sometimes carried through with the grain.—J. F.)

"Examination should be made of the threshed straw, and, if the larvæ are found therein, it should be destroyed, either by feeding or some other consumption of it before the ensuing spring. Dr. Harris records an instance where so many of the insects infested a straw bed in Cambridge, Mass., that they proved troublesome to children sleeping in the bed—their bites or stings being followed by considerable inflammation and irritation, which lasted several days. So numerous were they, that it was found necessary to empty the bed-tick and burn the straw."

SMUT IN SMALL GRAIN.

As in 1891, so during the past season, a great deal of hard smut occurred in the enormous wheat crop of Manitoba and the North-west. The following letter from the Manitoba editor of the *Farmers' Advocate* and the reply thereto will, it is hoped, draw the attention of the farmers of Canada to this important subject:—

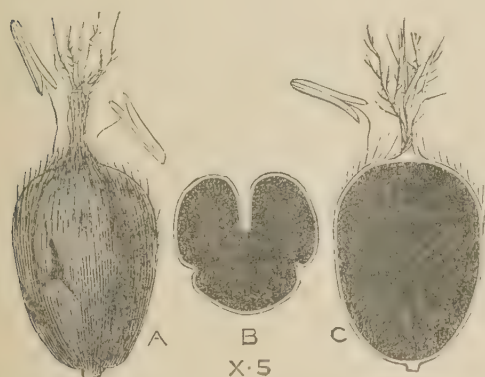


Fig. 4.—Hard Smut: infested grain enlarged.

"Winnipeg, Manitoba, 25th November, 1895.—As you are probably aware, there is a greater prevalence of smut through this western country this year than there ever was previously, and, in spite of all that has been said and written of the necessity of thoroughly bluestoning all seed wheat every year, still we find many farmers who have been careless in this respect. We also find a good many who claim that they did apply the bluestone treatment, and yet have their wheat more or less injured by this pest. Personally, I have every faith in the bluestone treatment, when thoroughly applied, as a preventive of ball smut in wheat and loose smut in oats and barley.

I have read all the American and Canadian bulletins that I could get hold of on this subject, but failed to obtain any information that would help one to form a theory accounting for the great prevalence of smut in this country, or why it should be much worse this year than other years. The only thing that occurs to me that may have effected the prevalence this season was the long, cold spring, during which wheat plants remained in a fit condition to receive the attacks of the fungus for a longer period than usual."—GEORGE H. GREIG.

Reply—"In reply to your question, I think you have struck right at the root of the matter when you suggest that the cause of the prevalence of smut this year is the much longer period last spring than usual when, owing to the copious rains, the conditions were favourable for the spawn of the developing fungus to attack the young wheat plants. See page 8, of *C. E. F. Bulletin* No. 3, where the growth of the smut plant is described from the spore to the stage when it is ready to attack the young wheat plant. It is first of all a self-sustaining plant growing in the soil, but when it comes in contact with the wheat plant it becomes a parasite, living in the tissues of the latter, and the prevalence or otherwise of smut is largely due to the weather being favourable to its development before it reaches the wheat plant. In my 1891 report the subject is

treated at some length. On page 206 you will find an article which I prepared for the *Farmers' Advocate*. The matter of bluestoning or 'pickling' wheat is one of those in which wise and thrifty farmers will always succeed better than the lazy or shiftless. There is now not the slightest doubt of the advantage of this treatment, and yet year after year apparently sensible men will neglect this inexpensive and easy method of preventing so much loss. Upon the Experimental Farm at Indian Head last summer I was particularly struck with some plots which Mr. Mackay had growing, side by side, of treated and untreated wheat, showing very plainly the great advantage of attending carefully to this matter. One of the most remarkable features of this whole subject is the way in which farmers will try and excuse their laziness—for that is really what it is—by shaking their heads, looking wise, and pretending that their neglect is due to some doubt existing about the way in which smut develops. The life-history of this parasite, for all practical purposes, is perfectly well understood, and has been for fifty years.

"A treatise on the disease was written as long ago as 1755, and for a hundred years it has been known by common-sense farmers in Great Britain, that, if they treat their seed, the crop grown from that seed is so much cleaner from smut that it pays them many times over for the trouble and expense of the operation. Moreover, this has been universally the experience of farmers in Manitoba and the North-west and it does seem strange when everybody knows how much depends upon it that farmers will dispute and argue and waste time over the development of the disease, a subject that really is of no interest to them practically, and the same men will neglect what at any rate, whether they understand the reason of it or not, they know to be a fact, that, if they 'pickle' their seed wheat, they will have a clean crop, and, if they do not, they will in all probability have a smutty one."—J. F.

Under date 28th December, Mr. Greig wrote: "I found at our late meetings of the Farmers' Institutes, that every intelligent person was willing to admit that bluestoning is a satisfactory preventive for smut when properly applied."

Remedies.—For practical purposes, all the different kinds of smuts which attack the various small grains may be treated as being the same, for all can be overcome by the same remedy. Many remedies have been recommended. Of these I advise the following as the best, which I think will meet all requirements:—

1. Dissolve one pound of blue-stone (copper sulphate) in 20 gallons of water; soak and stir the grain well in it and leave to soak for 12 hours; then soak in lime water, (quick lime 1 lb. slaked in ten times its weight of water, *i. e.* 1 gallon) for 10 minutes. Spread out thinly to dry.

2. Dissolve blue-stone (copper sulphate) at the rate of one pound to 2 gallons of water; place this in some large receptacle and pour in grain until it almost reaches to the surface of the liquid; stir well and skim all "smut-balls" and rubbish from the top. Leave the grain to soak for a quarter of an hour; then pour off the liquid and spread the grain out thinly to dry, and sift dry quick lime over it.

Should the above be inconvenient, the following may be used:—

3. One pound of copper sulphate is dissolved in a pailful of hot water, which is then sprinkled by one person over 10 bushels of wheat placed in a wagon box, whilst some one else keeps the grain well stirred.

FODDER PLANTS.

GRASSHOPPERS (*Acrydiidæ*), or more accurately Locusts, of three kinds, viz., the common Red-legged locust (*Melanoplus femur-rubrum*, De G.), Fig. 5, the Lesser Migratory Locust (*Melanoplus atlantis*, Riley) and the Two-striped Locust (*Melanoplus bivittatus*, Say) committed great havoc throughout extensive districts in Canada this year. The injury was greatest in those sections where drought prevailed.

"Gaspereau, King's Co., N.S., June 25.—Our dykes are swarming with grasshoppers which threaten to destroy a great deal of hay, and the oats being tenderer are likely to be a total loss."—J. L. GERTRIDGE.

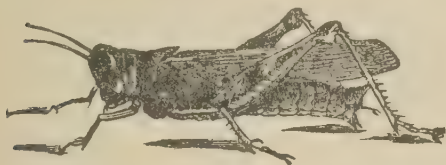


Fig. 5.—The Red-legged Locust.

"Wolfville, N.S., November 12.—The champion pest of the year has been the grasshopper: he has had full swing, and the pastures and hay fields have suffered very much. The steady dry weather which continued into September, prolonged the season of their ravages; in many places they invaded the gardens and ate all before them like the locusts of the west. If they are

as thick next year we must get some hopper-doers at work."—R. W. STARR.

"Ormsby, Hastings Co., Ont.—This has been the worst season for grasses I have seen for 40 years and the grasshoppers were very bad; they did not leave one blade above ground of those new grasses you sent me."—H. BEAUMONT.

Locusts were exceptionally destructive again this year on Sable Island. Through the kindness of Mr. J. Hardie, Chief Clerk of the Department of Marine and Fisheries, I have been allowed to print a report of the superintendent of the lighthouse establishment on Sable Island from which it will be seen how serious this loss has been.

Mr. Hardie wrote:—"October 29.—I am sorry to say that the report in regard to the ravages of the locusts on Sable Island is correct. A letter was received from our agent on the 14th instant, in which he states that it was necessary to send 50 tons of hay to the island owing to the ravages of the locusts."

SABLE ISLAND, July 5th, 1895.

SIR,—I find it necessary to again call your attention to the destruction to the vegetables and grasses by the locusts, and how the provisions for the stock will be affected. At the present time, it is a question if we shall be able to dig one mess of new potatoes; all the other vegetables have been entirely destroyed. I have mowed all the cultivated hay and have secured less than one load; last season, off the same ground, I got 14 loads. Now, as the wild grass is being eaten by the locusts in the same proportion, you will easily see that it will be impossible to secure enough fodder for the stock during winter; already the cows are failing in their milk, caused by the destruction to pasture. As we winter on the island about 90 head of cattle and 30 horses, we have made in the past one ton for each head, and probably a little over. We may secure some hay, but I have no hesitation in stating now that we will not make anything like the quantity in former years. This, later, will need to be considered. It will also be easily seen what the effect will be on the wild ponies, and an almost wholesale removal suggests itself to me. I do not think I can exaggerate the destruction these pests have caused, and in another month the whole island will look as though fire had run over it. Sable Island has had a variety of pests, but this one is the most destructive and far-reaching. No cure occurs to me, and, if they increase in the same proportion in future years, where or what will the end be?

R. J. BOUTILIER, *Superintendent.*

J. PARSONS, Esq.,
Agent, Department of Marine & Fisheries.

The following interesting account of injuries in the section of the province of Quebec north of Montreal has been kindly furnished by Mr. Rémi Hénault:—

“Ste-Elisabeth, Que., Dec. 28.—On our clayey loam lands in this and the neighbouring parishes, the loss due to the grasshoppers has been in oats 10 per cent in the grain, and from 15 to 20 per cent in the straw; in hay 15 to 20 per cent; in mixed timothy and clover 25 to 30 per cent; pease were not affected, and wheat but little, but buckwheat and green fodders such as mixtures of pease, tares and oats much more, because sown later and quite tender when the grasshoppers appeared about the 20th of June. Pastures suffered more than anything else; the grass was scarcely out of the ground when it was devoured. In the parish of St. Thomas de Joliette, to the south, where the soil is nearly altogether or three-quarters sand, the damage was much greater, in oats at least 50 per cent, in hay from 25 to 30 per cent. The leaves of tobacco were quite riddled and cut up. Pease were the crop that suffered least.”—RÉMI HÉNAULT.

Remedy.—Excellent results have followed the use of the implements called “Hopper-dozer,” and, when young locusts are observed to occur abundantly in June, it certainly will repay all time, trouble and expense to use them, from the increased crop which will be saved. They must be used early in the season, because the locusts become full grown by the end of June and are then able to fly long distances from place to place. I give herewith a simple plan from which one of these implements can be easily made. The following extracts are from Prof. Herbert Osborn’s writings and set forth plainly the advantages and the manner of making and using a hopper-dozer:—

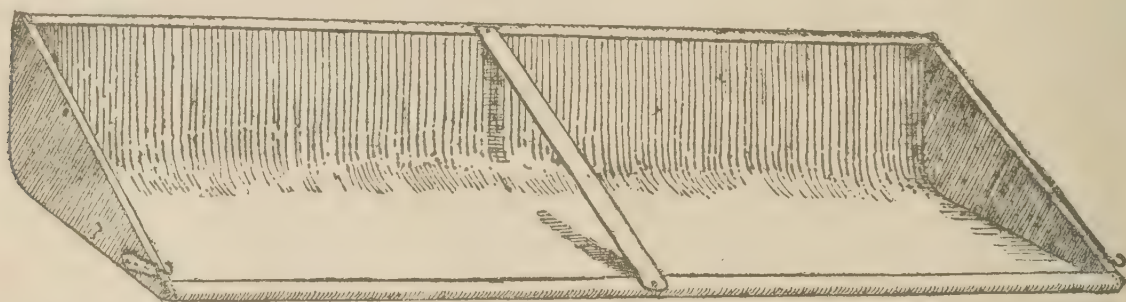


Fig. 6.—Hopper-dozer.

“In meadows and pastures we believe the use of the hopper-dozer the most practical plan that can be recommended. In many cases it can be used to capture these and the leaf-hoppers at the same time, especially if used when grasshoppers are still quite small and can be held by a thin layer of coal tar used on the simple flat sheet of iron. When larger they need a deeper layer of coal tar, or a pan of water with a covering of coal oil on it. A cheap and simple plan for this purpose, costing but from \$1.50 to \$2, was described many years ago by Prof. Riley. It consists of a strip of sheet iron 8 or 10 feet long, turned up 1 inch in front and 1 foot behind, with pieces soldered in at the ends (or made of wood) and hooks placed in front at the ends for the attachment of ropes. If to run on rough ground it will be better to put runners 1½ or 2 inches high underneath. Into this put a layer of coal tar half an inch deep, or water and kerosene. It can be drawn by a boy at each end, or by horse power if preferred.

“To treat pastures and meadows for grasshoppers and leaf-hoppers, it would seem from present experience the best plan to run over all grass lands early in May with the simple dozer described for leaf-hoppers (a piece of sheet-iron 8½ feet long and 2 feet wide, was coated on the upper side with coal tar, and lying flat on the sod was dragged along by means of three cords, one fastened at each end and one in the middle.) Pastures should be treated a second time about the middle of June. For meadows, the second treatment may follow hay cutting, if insects are abundant, and then, if grasshoppers appear in July in numbers, resort to the deep hopper-dozer described above.” (*Bull. 14, Iowa Ag. Exp. Station, p. 176.*)

Summarizing the results of his experiments with leaf-hoppers, the same writer says:—“Experiments with hopper-dozer for grass leaf-hoppers show that this method can be used very successfully in capturing the insects, that the simplest form, a flat sheet of sheet-iron was most satisfactory, that one application resulted in adding 34 per

cent to the crop of hay on a plot experimented on, and in one experiment leaf-hoppers were captured at the rate of 376,000 per acre."

These results are most striking, and one cannot but feel convinced that it would pay well to adopt systematically such a simple and cheap method of freeing pastures of the myriad insects which reduce the yield every year.

THE COTTONY GRASS-SCALE.

(*Eriopeltis festucae*, Fonsc.)



Fig. 7.—The Cottony Grass-scale: egg-sacs on grass, natural size.

During August last specimens of the egg-sacs of the Cottony Grass-scale, well represented in Fig. 7, were sent to me from Cape Breton Island, Nova Scotia. In previous years I had occasionally received some from the same province. Upon specimens found this year being sent to Mr. L. O. Howard at Washington for identification, he writes: "The scale which you call *Rhizococcus* is the same as we have received in former years from Nova Scotia. It is with little doubt *Eriopeltis festucae*." In no case have I been able to learn that the presence of this scale-insect was observed to have brought about any serious diminution in the hay crop. This, however, must undoubtedly have been the case from the large number of egg-sacs which were found in some fields. The following letters refer to this subject:—

"Baddeck, Cape Breton, N.S., August 22, 1895.—I herewith inclose some objects which have appeared in unusual quantity this season on one of my neighbour's fields. I find very few on my own place."

"October 24.—The grass on the hill where I found the accompanying specimens, shrunk much before haying; but whether the Cottony Grass-scales were the cause or whether it was due to the dryness of the season, cannot be said. I do not find any of these insects on good grass land, but only, so far as I have seen, on land which is high

and dry, and the grass poor, mostly brown top."—G. WHITLY.

"North Side, East Bay, C.B., N.S., August 26, 1895.—I send herewith some sprigs of grass bearing some insect deposit. It is very plentiful about here, being deposited on the butts of hay left after mowing or on other herbs. Please let me know what insect causes this deposit and if it is destructive to vegetation."

"September 26.—I send you as requested some more egg deposits. I cannot account for their abundance this year, unless the drought and the dry summers of the last three or four years have something to do with it. I noticed three years ago that grasshoppers were very plentiful after hay making, and was of the opinion that they were the cause of these white eggs; but this summer I changed my mind, on account of the scarcity of grasshoppers. These egg-sacs are not confined to my land, but are on all farms around, and I think they must be hurtful to cattle which eat them when feeding

on hay fields where they occur. The egg-sacs are found on about every fourth stem. I notice too that they are most numerous on run-out or poorly cultivated land. I believe also that they are more prevalent on heavy clay than any other kind of soil."—JAMES McDONALD.

"Grand Narrows, C.B., N.S., December 27.—*Re* Cottony Grass-scale, I first noticed it July 28, then only a few, and after Aug. 10 did not observe any increase in numbers. The hay and grass were very short. The sacs were principally placed at the base of the leaves and varied in height from the ground from two to seven inches. From the size and strength of the sacs I looked for a comparatively large insect, not a scale, and from the lateness in the season when the sacs appeared, as well as from their strength and their firm attachment to the grass, I concluded that they would remain in the fields all the winter, and therefore was not in a hurry to write to you. I think a good plan would be to burn the grass on the ground in spring to destroy the eggs or young. If all the eggs in each sac hatch out, there will be an awful number next summer. I do not think that much damage was done last summer, all the best hay being cut before the sacs appeared."—D. G. CRAWFORD.

In reference to the above letters, it may be pointed out that the injury was probably going on all through the early part of the season and the insects would not be noticed until the conspicuously white egg-sacs were formed by the females. The occurrence of this insect in the past has been of an intermittent nature, and, moreover, a remarkable feature this year is that nearly every egg-sac examined was found to contain one or two parasitic larvæ which had devoured the greater part of the eggs. On page 385 of *Insect Life*, Vol. I., under the heading of "A Rhizococcus on Grass" will be found a record of another outbreak of this same Cottony Grass-scale which had been found in 1888 by Prof. A. H. Mackay in large numbers over an extensive marshy flat in Cumberland county N. S., every blade of dead grass having one or more egg-sacs attached. Several specimens of a parasitic fly belonging to the the genus *Leucopis* were bred from some of these sacs, and, as far as I can learn, there was no re-appearance of the insect in the locality the following year.

In view of the above facts it does not seem probable that this insect will ever develop into a serious pest. Should it do so, undoubtedly the measure of burning off the "old fog" or dead grass early in spring would be an easy and effectual remedy.

There is very little to be found in literature with regard to the division of scale insects to which the Cottony Grass-scale belongs. The following note has been very kindly sent me by Prof. T. D. A. Cockerell, of the New Mexico Agricultural Experiment Station, who has been making a special study of Canadian Coccidæ.

Note on Eriopeltis Festucae.

The genus *Eriopeltis*, Signoret, consists of three species, hitherto known only from Europe. The first was described by Fonscolombe about 60 years ago as *Coccus festucae*, and made by Signoret in 1871 the type of *Eriopeltis*. In 1876 Signoret described a second species, *E. Lichtensteinii*, found at Montpellier in France. This species is also found at Hyères and in Holland, thus extending over about 8° of latitude. It has the sac very densely felted, whereas that of *E. festucae* presents curled woolly filaments, almost squamose. *E. festucae* extends at least as far north, having been recorded from Cheshire, England, by Mr. Newstead, *Ent. Mo. Mag.*, 1891, p. 165:—

"In 1893, Giard announced a third species, *E. brachypodii*, found on leaves of a grass, *Brachypodium pinnatum*, L., near Boulogne in France. (*Ann. Soc. Ent. France*, lxii., p. cxcix.) His account of it, like Signoret's original announcement of *E. Lichtensteinii*, is very short. It is, he says, very frequently parasitized by *Leucopis annulipes*, Zett. Mr. E. A. Butler in *Knowledge*, July 2, 1894, p. 148, gives a good popular description of *E. festucae*, as follows:—

"This forms little compact oval tufts, like pieces of cotton wool, attached to the stems and blades of certain grasses, and there is certainly nothing whatever in their external appearance to suggest any connection with insects, unless, indeed, they might be cocoons of small ichneumon flies. But a close examination, revealing a number of separate threads standing out in all directions, would soon dispel this idea, and would

leave their real nature as problematical as ever. Though apparently not uncommon, they have not long been generally known in this country (England), having previously, no doubt, been overlooked, partly because of the little attention that was until recently paid to the Coccidæ, and partly because of the completeness of their disguise. They seem to have been first noticed in this country in 1856, when there is a reference to them in the *Proceedings of the Entomological Society of London*; but that was soon forgotten, and they passed out of knowledge till 1885, when Mr. Q. C. Bignell again called attention to them."

Eriopeltis may be defined as a genus of Lecaniine Coccidæ in which the female covers herself with a complete sac of cotton-like material. The nearest approach to it hitherto reported from North America is *Lichtensia* (*L. lycii*, Ckll., New Mexico; see *Psyche*, 1895), but that is very different.

FRUITS.

Owing to the late frosts followed by severe drought, in most of Ontario, parts of Quebec and the Maritime Provinces, the fruit crop has been very irregular this year, being very poor indeed in some parts, but well up to the average in other districts.

"Grimsby, Ont., Nov. 6.—During the season of 1895 there have been comparatively few insect enemies."—L. WOOLVERTON.

"Near the shores of lakes Erie and Ontario and in the counties along the St. Lawrence, apples and many other fruits have been abundant. Insects have done hardly as much damage as usual." (*Ontario Crop Report*, Nov. 15, 1895.)

In the Eastern Townships of Quebec good crops of apples were gathered. In Nova Scotia apples have been abundant and of a good quality, although considerable injury has been done by insects in some parts, Canker-worm, Shot-borer, Codling Moth and Cherry Slug all being complained of. The Hon. George Whitman, of Round Hill, Annapolis county, in *Nova Scotia Crop Report*, Nov., 1895, says:—"The apple crop in the district is the largest we have had for nine years and of exceptional quality."

Mr. S. C. Parker, Secretary of the Nova Scotia Fruit Growers' Association, writes:—

"Berwick, N.S., Nov. 25.—The past season has been very prolific in insect life, but, on the other hand, has not seemed favourable to the development of fungous diseases, and the apple crop is better in quality than usual."

"Wolfville, N.S., Nov. 12.—The caterpillar (*Clisiocampa*) and Canker-worms have been less troublesome this year than usual. Codling moth is also doing less damage. Some of the leaf-rollers and bud-eaters seem to increase in orchards where spraying is not practised. The Oyster-shell Bark-louse is complained of where trees are neglected, especially in the eastern part of the province. The Imported Currant Saw-fly seems to be less troublesome than usual. The White Cabbage Butterfly has not done much damage; but we still have to fight the Potato bug or lose the crop. Our worst pests this year have been the Pear-tree Slug, the Shot-borer and Grasshoppers."—R. W. STARR.

A remarkable exemption from insect injuries to fruit trees is reported by Mr. Charles E. Brown, of Yarmouth, N.S., who writes:—

"Nov. 16.—We are singularly exempt from insect visitations in this county, even the Potato bug, which has gradually spread over the province, has made no serious progress here. Fruit trees are not, so far, visited by any insect enemies in sufficient numbers to require the application of remedies. I doubt if any grower has ever tried the experiment of spraying."

In British Columbia, fruit crops of all kinds were enormous. Plums, as well as cherries, apples and pears, being so abundant that everywhere the trees had to be propped up. There was, generally speaking, little injury from insects observable in orchards of the interior. However, in the Okanagan valley, both at Penticton, in the garden of Mr. Ellis, and at Vernon, on the B. X. Ranch of Mr. F. Barnard, M.P., a few apple trees were seriously infested with the Apple Aphis, and plum trees with a grayish-green Aphis, at Kelowna and Vernon. Red Spider was also seen in great abundance on a raspberry

patch at the B. X. Ranch. Along the Fraser River and in the coast region, Apple Aphis, Woolly Aphis, and the same grayish-green Aphis on plum trees as was seen at Vernon were injuriously abundant. The energetic measures advised by the Provincial Deputy Minister of Agriculture and the Inspector of Fruit Pests are already showing good results, as is evidenced by the large number of fruit growers who are adopting the new methods of advanced horticulture by spraying and fertilizing their trees so as to enable them to withstand the attacks of their insect foes.

Most of the usual fruit pests of Canada were complained of to a certain extent last season, and some new points of interest have come out in correspondence or subsequent investigation. Some of these may be mentioned:—

The CODLING MOTH.—Mr. Murray Pettit, of Winona, Ont., again found this year that the second brood was extremely difficult to fight, and much harm was done in his apple and pear orchard. Mr. A. W. Peart, of Freeman, Ont., says that it holds its own, although in some sections it did but little harm this year.

Mr. L. Woolverton writes: "Grimsby, Nov. 6.—In the early part of the season the Codling Moth was very little seen; but later in the season it was very troublesome and caused a great loss to those growers who did not continue their spraying to the very end." Up to the present there has been no authentic instance of the occurrence of the Codling Moth in British Columbia.

The OYSTER-SHELL BARK-LOUSE now occurs throughout Canada, but less abundantly in British Columbia than in the east. Mr. T. A. Sharpe, Agassiz, B.C., sent specimens of this insect on the wild crab, *Pyrus rivularis*, and expressly states:—"We have no bark-louse in our apple or pear orchard."

Referring to the advantages of good cultivation, Mr. A. W. Peart, of Freeman, Ont., says: "It appears to be about driven out from this locality, so much so that I have difficulty in securing specimens. Improved cultivation of orchards and better general care probably lies at the bottom of this."

The EYE-SPOTTED BUD-MOTH.—Specimens were sent in from Nova Scotia, Ontario, about Lake Ontario, and from St. Elmo, B.C. These latter were the first specimens from British Columbia, and were from the orchard of Mr. C. F. Pound. While attending a meeting of fruit growers at Kelowna, in the Okanagan Valley, B.C., I was told by three or four of the fruit growers present of injuries by a bud moth which was probably this species.

The SCURFY BARK-LOUSE (*Chionaspis furfurus*, Fitch) occurred on a few trees in the orchard of Mr. W. W. Hilborn at Leamington, Ont. These were easily destroyed by treatment with kerosene emulsion.

The APPLE-LEAF SEWER (*Phoxopteris nubeculana*, Clem.) occurred abundantly at Walkerton, Ont. Specimens were sent by Mr. A. H. Pettit from the above place on September 18, with the following note: "I found Mr. David Smith's orchard here badly infested. I inclose you some leaves and a little twig, just to show you how numerous the caterpillars are. I did not find very many on the sprayed trees."

THE PEAR SLUG (*Eriocampa cerasi*, Peck) has again been a cause of rather considerable loss in Nova Scotia, Ontario, and British Columbia. Mr. R. W. Starr reports that pear trees in gardens in Wolfville, N.S., had their foliage all destroyed in June. The same insect was reported from St. Stephens, N.B., on a cherry tree, and from many places in Ontario and British Columbia on pear, plum, and cherry trees, as well as on mountain ash trees and hawthorn bushes. Mr. A. W. Peart, of Freeman, Ont., writes: "The Pear or Plum Slug has appeared in considerable force this year, during July and August. I noticed two broods. A section of my plum trees was severely attacked. Paris green in water, usual strength, appears to be of little use. It seems to me that dusting would do better."

I found the Pear Slug present in some numbers in almost every cherry and pear orchard in British Columbia.

I am unable to understand Mr. Peart's failure to control this insect with Paris green. I have found, as stated in my report of last year, that spraying with the ordinary strength (1 lb. Paris green, 1 lb. quicklime, and 200 gallons of water), or dusting with freshly slaked lime, or Paris green diluted with 50 times its weight of some dry powder, are always effective.

THE STRAWBERRY SLUG (*Harpiphorus maculatus*, Norton).—Mr. L. A. Woolverton sent me specimens of the larvæ of the Strawberry Saw-fly, found by Mr. Peter Breman, of Lakeside, Ont., in his plantations, where they were doing considerable damage. There are two broods of this insect in the season, the first in May, the second in July and August. Paris green (1 oz. in 10 gallons of water), or white hellebore (1 oz. in 2 gallons of water), are the best remedies. The first brood lasts almost until the fruit is ripe. For this brood white hellebore is the safest application.



Fig. 8.—The Raspberry Root borer: a, male moth; b, female moth.

THE RASPBERRY ROOT-BORER (*Bembecia marginata*, Harr.).—This insect, which is occasionally troublesome in old raspberry plantations in Ontario and Quebec, appeared in large numbers in Vancouver Island during 1894. Many infested raspberry roots were sent to me by Mr. G. A. Knight last February, from which the moths emerged in July.

“VICTORIA, B.C., Feb. 15.—I mail you to-day some Raspberry Borers. I do not know if they are new to this country or not; I have never seen them before. I noticed last summer that the bed looked sick, and, being busy, I did not prune them until a few days ago, when I found that the roots were full of borers. I shall grub all of the plants up and burn them. I imported the original canes from New Jersey about seven years ago, and probably at the same time the first borers as well.”—G. A. KNIGHT.

When visiting some of the old gardens and fruit plantations at Victoria last August, I found that this insect had done much harm, and many of the brown eggs were to be found on the leaves of raspberry canes.

In the *Fourth Report* of the British Columbian Department of Agriculture, Mr. Palmer says: “This pest has become very prevalent in the vicinity of Victoria, where it has wrought great damage to the raspberry canes. It is not reported from other parts of the province.”

The perfect female insect of this borer is a black clear-winged moth with a body striped with yellow like a wasp. She lays her eggs on the leaves of raspberries in July and sometimes well on into August. The attacks of the larvæ on the roots are seldom recognized, and many raspberry canes thought to have been killed by winter have really been destroyed by this borer.

This is a difficult enemy to fight against. The chief means of lessening its attacks is to start new plantations in good soil and keep these well worked and cultivated. A liberal dressing with hardwood ashes to which some crude carbolic acid (1 oz. in a 2½ gallon pail) had been added, has given good results. There is, however, great difficulty in dressing a patch which has become badly infested.

CLICK BEETLES (*Corymbites caricinus*, Germ., etc.).—Again this year complaints have been received of serious injury to apple blossoms by the perfect beetles of an Elater. Specimens were sent from British Columbia, Sherbrooke, Que., and from the Annapolis Valley in Nova Scotia.

This attack on apple blossoms was first referred to in my report for 1892, when specimens were sent from the Nappan Experimental Farm, and since then every year reports of slight injury have been received. In the third report of the Department of Agriculture of British Columbia (1894), it is stated that one kind, *Corymbites caricinus*, “has been committing great ravages on the lower mainland, not only on apples, but on other fruit blossoms as well. It has not been reported from the upper country nor from any part of the islands. It has made its appearance in great numbers at Mission where during 1893 it completely denuded some orchards of blossoms, and this year it has appeared at the Delta, where Mr. E. Hutcherson found it doing great damage to the blossoms of fruit trees.”

As a remedy nothing better has so far been suggested than beating the beetles from the trees over sheets or into beating nets, and then destroying them. They drop readily

from the trees when these are jarred and feign death for some time after falling ; this time may be prolonged by shaking the sheets or nets, so that there is little difficulty in collecting them. Mr. Hutcherson tried this remedy, and found it successful.

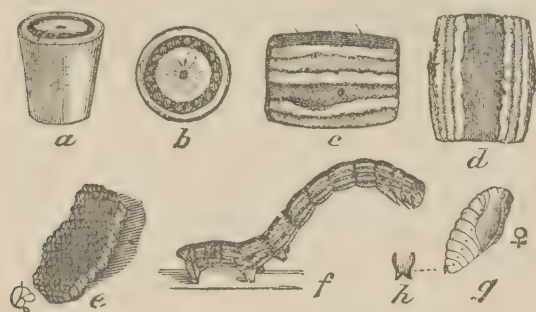


Fig. 9.—The Autumn Canker-worm : *a*, *b*, side and end views of egg ; *c*, mass of eggs ; *f*, caterpillar ; *e*, *d*, segments of caterpillar ; *g*, pupa.—*a*, *b*, *c*, *d*, enlarged ; *e*, *f*, *g*, natural size.

CANKER-WORMS (*Anisopteryx vernata*, Peck, and *A. pometaria*, Harris).—*Attack*.—There are two kinds of caterpillars which attack apple trees, and which are known as Canker-worms. Of one, the Spring Canker-worm, the wingless female moths appear chiefly in the spring and lay oval pearly-white eggs in irregular masses beneath flakes of bark, etc. Of the other, the Autumn Canker-worm, most of the moths appear late in the season and lay eggs which are flattened at the top (Fig. 9 *a*, *b*, *e*,) and laid regularly in clusters of about 100 or more on the outside of the bark. When full-grown the caterpillars of both are much alike, and are brownish-looking larvæ, about an inch in

length. At Fig. 9 are shown the caterpillar and eggs of the Autumn Canker-worm. The females of both kinds are spider-like wingless creatures ; but the males are delicate moths, with gauzy gray wings. (Fig. 10 *b* female, and *a* male.)



Fig. 10.—The Autumn Canker-worm : *a*, male moth ; *b*, female moth ; *c*, an antenna of female ; *d*, an abdominal segment of female.

Remedy.—There are several mechanical contrivances for keeping the females from ascending the trees to lay their eggs ; but under ordinary circumstances none of these can compare for efficacy with spraying the trees in the spring time with Paris green 1 pound and fresh lime 1 pound to 200 gallons of water. If this be done immediately after the flowers have fallen, both the Canker-worm and other leaf-eating insects, as

well as the young larvæ of the Codling Moth, will be killed at the same time.

Injuries by Canker-worms have been reported from Nova Scotia, Quebec and Western Ontario. Most of my correspondents have had strikingly successful results from spraying with Paris green 1 lb. and quick lime 1 lb. in 200 gallons of water ; but on the other hand, two or three, from special circumstances, have had better satisfaction with the old plan of banding the trees. As these circumstances may occur with others, I give the experience of some of the best observers.

“ Berwick, N.S., Nov. 25.—Canker-worms were prevalent in several localities in Nova Scotia during the past season and did considerable injury. In some orchards that came under my notice, they did much harm before they were discovered, and the first application of Paris green had little effect, owing to the material being impure. Before a second application was made, the trees in a few orchards were completely defoliated.”—S. C. PARKER.

“ Church Street, Cornwallis, N. S., December 7.—Our experience leads us to decide in favour of the ink, as, in the first place, it is a safe remedy, can be used by any person without injuring his crop of fruit or the trees, and, if carefully looked after, will certainly save his crop ; in orchards that are tilled for other crops (as about all young orchards here are) it saves driving over them with a cart, cutting down potato rows and tramping out the seed ; and again, the ink is applied in the fall and the spring, when the farmer or his boy are more at leisure and can attend to applying the ink, as the ink does not have to be applied until the first heavy frost in the fall, and as soon as the frost begins to break in the spring. At that time there is very little work to attend to ; but later in the spring the farmer finds himself very much driven by his work and has very little time to attend to spraying. Of course the heaviest expense is the ink, which costs about 12 cents a pound ; 20 pounds will answer for an orchard of five acres, say the trees are about 20 or 30 years' growth. The above amount of ink will require four gallons of fish oil—cost 50 cents per gallon—and, I suppose, about 15 pounds of paper at four cents per pound, which all told is not a very large outlay.

You take the roll of paper and a saw, cut off strips about six inches wide, then two men start out armed with a sharp knife, a tack hammer and two bunches of tacks. One man draws the paper around the tree, cuts it off with his knife, lets it drop and passes along to the next tree; the next man tacks it closely and firmly to the tree. Two men will go over an orchard of three acres in half a day. The paper is left on the trees ready for the next spring. After the second or third application of ink, a very little goes a long way. A smart boy can go over an orchard of the above size in about two hours. With regard to spraying, we used a small pump and one dessert-spoonful of green to a bucket of water, or in that proportion. This did not at all the times destroy the Canker-worm, and in nearly every trial did more or less injure the crop of fruit. We kept it well stirred. I know of a number of cases where the large pump was used: the crop was injured, I think, quite as badly as though it had been left to the Canker-worm. In a few cases I have heard persons claim that spraying had proved effectual, and in about all instances the same formula was used. I think it wants a man better posted on the subject of spraying than the majority of farmers are as to the time and manner of applying, and one who can give all attention to the business. My brother experimented with a band of wire netting, such as is used for fly screens, adjusted around the tree, funnel-shaped, and succeeded in capturing a large number of moths which crawled up under the netting. I think there has been a larger quantity of ink used this fall than previously, which strengthens me in my belief in ink as a destroyer of Canker-worms."—E. J. ARMSTRONG.

"Starr's Point, N.S., December 16.—Respecting spraying *versus* printer's ink for the destruction of the Canker-worm. It is possible that my reason for preferring the ink for spraying may not be as applicable to all sections of the Dominion as it certainly is here, where apple trees frequently grow a height of 25 to 30 feet and spread from 35 to 45 feet. Spraying such trees is quite another matter than for trees half that size. We find that spraying, to be effectual, must be done when the worms are small, and it frequently happens that the trees are in full bloom at that time. It has generally been conceded that spraying the bloom endangers the setting of the fruit, and to delay is equally fatal; for the worms get the start and usually so improve time as to defy all efforts to exterminate them, and between the heavy and oft-times repeated doses of the poison and the ravages of the worms, the crop suffers much, if it is not quite destroyed. I have in my mind several fine orchards that suffered in precisely this way during the past summer, the crop being almost an entire failure. Spraying with us has not been a success, chiefly because it has usually been delayed too long; and then, to kill the large worms, the dose is either too strong for the foliage, or, what has usually been much worse, the operation has been repeated, when the foliage has been most surely destroyed. I have tried spraying and found I could certainly kill the worms and not hurt the foliage if I paid no attention to the bloom; but, even then, when the trees were very large, completely covering the ground, I found the labour and expense nearly if not quite equal to the application of the ink. I think the application of the ink bands the safest for several reasons: first, it does not endanger the bloom; secondly, men are not so liable to injure the foliage by any error or indiscretion; and thirdly, the size of the tree is not a difficulty only to be overcome by the use of the best spraying apparatus and in conjunction with complete knowledge of the business. If you can determine that the bloom is not injured by the spraying, no matter what time it may be done—and if horticulturists obtain the best possible apparatus and all learn to use it with judgment and discretion and if the trees are of moderate dimensions, not one of these conditions being omitted,—then, but not till then do I think there can be any comparison between the two methods."—I. E. STARR.

"Burlington, Ont., January 14.—You particularly ask the formula for the preparation used to entrap the female Canker-worm moth. For autumn application or early spring when the weather is cold, use a mixture of castor oil 2 lbs. to common resin 3 lbs. For warmer weather castor oil 2 lbs., resin 4 lbs. The oil and resin should be heated slowly and no more than to thoroughly dissolve the resin; stir frequently to thoroughly mix; apply warm, not hot, directly on the trunk of the tree with a paint brush, making a band about 3 inches wide; of course, the loose and rough bark must be scraped off before

putting on the band. It is very important to use a non-drying oil for the mixture, castor oil being the best and not injurious to the trees. The work of banding in the above mentioned way is not so great as might be supposed at first; an active man can go over 250 trees in 10 hours if the mixture is ready for use. Should the mixture get too cold to spread readily, it may be easily and quickly brought to proper temperature by using a portable oil stove. It is best to put on the first coat plentifully so as to leave a good body of material, and care must be taken that all crevices and irregularities receive a coat. In this neighbourhood the female moth seldom appears before the last week in October or the first week in November, and never before the first frosts of autumn. If watched for, and the band is applied when the female first appears on the tree trunk (where it often remains for days awaiting the male, particularly if the weather should be cold), thousands are caught by the band and many of the males are also caught, as their delicate silky wings adhere on the slightest touch. Thus two ends are accomplished: the female is prevented from ascending, and the male from fertilizing the eggs. Where many fail in the successful use of the band, is in not removing the clusters of eggs and bodies of females from the trunk and burning them at the end of the season. In their determined efforts to perpetuate the species, the females deposit their eggs on the trunk below the band; if not removed, these will hatch in the spring following, and, as the band will by this time be hardened, the larvæ can ascend the tree. I had experience of this in the summer of 1893. I had the band applied in autumn of '92 and kept the insects below it, but neglected to remove the eggs before the following spring ('93). I did not renew the band in spring of '93 in time, so that much of the benefit of my labour of the previous autumn was lost and I had the worst dose of Canker-worm I ever saw; they were over my trees in millions and it was a clear case of fight or lose my trees. I commenced to spray with Paris green, which killed a large number and caused many others to spin to the ground (doubtless in search of more congenial quarters), where after a time they seemed to recover and again started for the trees; now at this time was when the band did its best work, I had it renewed on all the trees and not a caterpillar ever placed its foot above it; but they collected by thousands below and starved to death; they were so numerous that the trunks seemed alive, *this after spraying, be it remembered*. We destroyed them by sweeping with whisks into a pan made out of a sheet of zinc with a piece cut out of one side so as to fit the tree; after collecting in this way, a little coal oil sprinkled over the mass and fired finished their course. This meant work and plenty of it; but the result, as shown this year in the cleaning out of the enemy, has fully repaid my time and expense, parts of my orchards where the insects were in greatest force being now quite free from them. The band may need renewal once or twice after the first application; but the second does not require as much labour or material as the first. I believe that Paris green used in conjunction with the band in the manner described, will (if work is faithfully performed) clear any orchard of this troublesome pest in one season. The Climbing Cut-worm and many other creeping larvæ are deterred by the band from ascending the trunk."—O. T. SPRINGER.

The chief difficulties, then, which make spraying less popular than "banding" with the above observers, are as follows:—

1. In some seasons the young larvæ do not hatch until the apple trees are in blossom, when spraying with poisons *cannot* be allowed. The fruit grower must not spray when the flowers are open, because it would most probably injure their essential organs, thus reducing his crop; and, again, because he would certainly poison his valuable allies, the bees, either his own or his neighbour's highly prized possession.

In regard to this, if spraying with Paris green be practised just immediately before the buds of the blossoms expand, no injury will be done to either bees or blossoms, and any young caterpillars that have hatched will be killed. Those that hatch after this will be destroyed by the poison on the leaves, or by the next spraying ten days later.

As stated above, where spraying with Paris green has been carefully done, it has been found most effective. If an equal quantity of quick lime be mixed with the Paris green, and 200 gallons of water be used for each pound of Paris green, there will be no injury to the foliage, even if the spraying be repeated three or four times; this is frequently done for the Codling Moth, as well as for this pest.

2. With regard to the inconvenience of spraying large trees and of driving among them when other crops are cultivated in the orchard, little can be said. This will, of course, vary with the nature of the apparatus used and the circumstances of the operator. However, the elevation of a nozzle is not a very difficult matter, if a bamboo pole and some light brass or rubber tubing be obtainable.

3. If it be thought wise to grow potatoes or some other crop between the trees in an orchard, the width of the rows can with very little trouble be so arranged that the spraying pump can be driven between the trees without any injury to the crop beneath. This I have seen in very many instances in Ontario, Quebec and British Columbia. Most of the spraying which is necessary in orchards, is done early in the season before the secondary crop has made much growth. Another point of very great import in the case of Canker-worms is that the female moth is unable to fly, and, compared with that of other insects, the spread of Canker-worms is slow. If thorough work be done in clearing an orchard of this pest and there are no infested trees in close proximity, it will probably remain free of the caterpillar for many years.

Mr. A. W. Peart states that in an orchard where he has sprayed persistently for years the Canker-worm does little harm; and Prof. Bailey, of Cornell University, in a late bulletin, when treating of this subject, concludes:—

“The reader is familiar with the bandages of tar, printer’s ink, cotton and other materials placed about the trees to prevent the female moth from climbing up. These devices are very serviceable for large shade trees; but, if the fruit grower keeps his orchard in cultivation and sprays honestly once or twice each year for Codling Moth and other insects, he need not fear the Canker-worm.”

THE CIGAR CASE-BEARER.

(*Coleophora Fletcherella*, Fernald).

During the past year, there have been fewer complaints of injury by this insect than has been the case for the last two or three years. In the well established colonies mentioned in my report of last year, further experiments have been made with the view of discovering a practical remedy. In May last, an excellent and very complete account of the life-history of this insect, copiously illustrated with figures, appeared from the pen of Mr. M. V. Slingerland, of Cornell University. My correspondents, Mr. Edwin Worden, of Oshawa, and Mr. Harold Jones, of Maitland, have continued their experiments carefully. Taking into consideration the life habits of this insect, which have now been completely worked out, together with the experience of several practical fruit growers, I think we may come to the following conclusions:—

The Cigar Case-bearer, when numerous, is a serious pest of the apple tree, and occasionally also of the pear and plum. The most injury results from the young caterpillars early in spring attacking the unexpanded buds, and later the flower stems, the forming fruit, and the foliage.

The results of experiments show that this insect can be controlled by spraying with Paris green and kerosene emulsion; but very thorough and persistent work is necessary. The best results have followed spraying the infested trees very early in the spring with kerosene emulsion, and repeating the operation once or twice at short intervals, four or five days later. The first application may be made with the standard Riley-Hubbard emulsion reduced with only five parts of water. After the leaves expand, the emulsion should be diluted with nine parts of water. Good results have also been obtained by spraying with Paris green. Now that the operation of spraying fruit trees with different compounds for the destruction of injurious insects and fungi is getting to be generally adopted by the best fruit growers throughout Canada, the only change necessary in the advised methods will be to spray rather oftener where this insect is known to occur. In the spraying calendar, printed on page 16 of our *C.E.F. Bulletin 23*, it is advised to spray apple trees first of all with copper sulphate, 1 lb. to water, 25 gallons, before the buds start; to this solution I would add 4 ounces of Paris green, and would make the application *immediately* before the buds open, to be followed about three days after the bursting of the buds by a spraying either with kerosene emulsion (1 part to

9 of water), or Bordeaux mixture and Paris green, to be made as recommended in *Bulletin 23*, page 17, *i.e.*, copper sulphate, 4 lbs. ; quicklime, 4 lbs. ; Paris green, 4 ozs. ; water, 1 barrel (about 45 gallons).

When the Case-bearer is abundant, it will be well to repeat the application a few days later, which will bring it, in the case of most varieties of apples, to just before the blossoms expand. The next spraying must not be made until the petals fall from the blossoms.

The above treatment will be found effective against several other insects, as the Codling Moth, the Eye-spotted Bud Moth, Canker-worm, Curculio, as well as against that very injurious disease, the Black Spot (*Fusicladium dendriticum*).

Mr. Harold Jones, of Maitland, has experimented chiefly with kerosene emulsion, and he reports to me at the end of the season as follows:—

"Maitland, Ont.—In reply to your letter of the end of September, I now send you sample of apple tree twigs that were sprayed with kerosene emulsion for Case-bearer. On the whole, the results have been very satisfactory, though through press of time I was prevented from spraying quite as soon as I should have done. I sprayed the first week in October and at that time a number of the insects had left the foliage, but enough still remained to experiment on.

"On trees sprayed I find a great reduction in the numbers attached to the twigs, and they have not worked down to the body of the trees at all. On the leaves lying on the ground I find some insects still attached, that never left the foliage. In the sample I send, I was able to find a limb with leaves still on and you will notice there are insects on them. A mixture of one part of emulsion to five gallons of water gave the best results."

The twigs sent by Mr. Jones certainly bore very few specimens of the young hibernating larvæ of the Cigar Case-bearer. There were, however, several of the small pistol-shaped cases of another species of case-bearer, *viz.*, the Apple-tree Case-bearer (*Coleophora malivorella*, Riley), Fig. 11, a species which has never been very injurious in Canada. The specimens upon the leaves referred to by Mr. Jones in the above extract were all empty summer cases from which the moths had emerged in July.

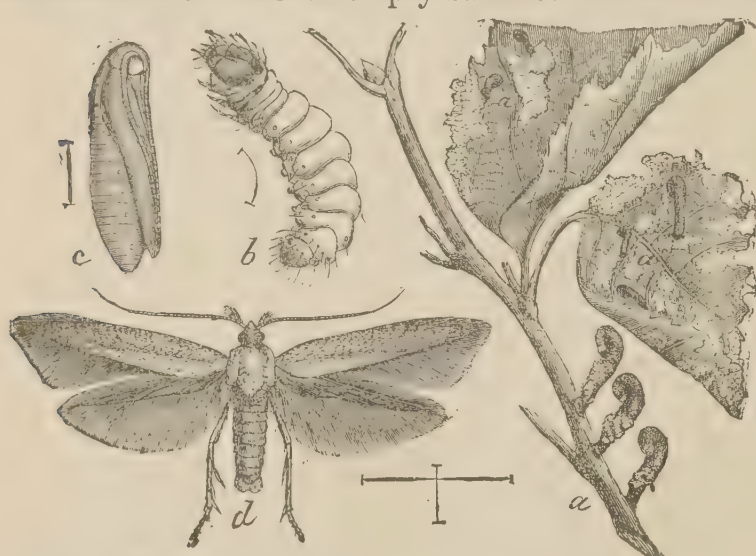


Fig. 11.—The Apple Tree Case Bearer: *a*, Pistol-shaped cases of the caterpillar; *b*, caterpillar; *c*, pupa; *d*, moth—*a*, natural size; *b*, *c*, *d*, enlarged.

Another method of fighting the Cigar Case-bearer has been successfully tried at Oshawa, Ont.

"Oshawa, Ont., Dec., 28, 1894. —One of my neighbours sprayed his orchards just after the blossom fell, with Paris green and concentrated lye. He says he cleaned his trees from the Cigar Case-bearer and bark-louse at one spraying. I tried the concentrated lye last spring, about the middle of May, without Paris green, just as the Cigar Case-bearer began to move; but I did not think it was more effectual than the Paris green."

"January 8, 1895.—It did not kill any Case-bearers, but it cleaned the trees from old moss and the bark-louse. My neighbour used three cans lye and $\frac{1}{4}$ pound Paris green. He had beautiful weather, dry for about ten days after the spraying."

"June 5.—I sprayed with kerosene emulsion, as you suggested, just as the leaves began to unfold and the young caterpillars began to eat. It killed a great many: but there are as many left. I am about discouraged. I have had good success spraying for the Codling Moth and the Spot on the apple; if these little pests of Case-bearers will only let the foliage alone, the trees promise a fair crop of apples in this section. I am now spraying for the Codling Moth and the bark-louse with Paris green and concentrated lye."

"December 10.—I used 3 lbs. of lye (if there is a pound in a can) to 45 gallons water. I had about 700 barrels of apples of the very best quality and shipped them to Simons, Shuttleworth and Co., Liverpool; and to use their own words, they showed all the rest a clean pair of heels and got me the top prices of the day. I inclose you an account sales of one car of apples. I am satisfied the spraying is doing my orchard good. I had very few culls: 700 barrels is not a very good crop from my orchard, but the Baldwins did not blossom this year. The lye did not injure the foliage in the least, not nearly so much as the kerosene emulsion. The lye is so easily mixed; but the kerosene emulsion seems to accumulate at the bottom of the barrel and the last few gallons will burn the foliage if one is not very careful. I am getting in one thousand bushels of wood ashes this winter and next June I am going to drive through the orchard in between the rows, the same as spraying and throw about a half bushel of ashes all through the tree early in the morning or on a damp day. I tried this on a few trees and it acts splendidly. The Cigar Case-bearer does not like ashes any more than coal oil. I think I have about conquered the case-bearers or they are getting tired of these parts.'—EDWIN WORDEN.

THE PEACH BARK-BORER.

(*Phlæotribus liminaris*, Harris.)

Attack:—Small cylindrical beetles, one-twelfth of an inch in length, of a brownish-black colour, covered with short hairs, which bore in the bark of peach trees, and, if numerous, cause the death of the tree in three or four years. The presence of these beetles is easily recognized in summer by a conspicuous red powder on the bark which is the borings cast out of the holes by them in their mining work, and, in the winter and spring, by enormous quantities of gum which oozes from the infested trees, thus greatly reducing their vitality.

This injurious little enemy of the peach tree has again been reported as the cause of much loss among peach trees in the Niagara district. Mr. J. C. McGuigan, of Cedar Springs, Ont., speaks of "finding the beetles mostly in old trees."

Mr. Alex. Muir writes from Niagara of serious injury to his peach trees. He first noticed the injury in 1893, and observed that the insect was spreading rapidly. As much as two quarts of gum had oozed from some of his old trees. He has found white-washing his trees of little use.

In my last report I gave an account of some careful experiments by Mr. C. E. Fisher, of Dulverton Farm, Queenston, Ont. I called on Mr. Fisher in the autumn of 1894; after discussing the matter he agreed to try experiments with a soapwash and carbolic acid, which had been omitted from his series of experiments in 1894. The following extracts will indicate that apparently a practical remedy for this beetle has been discovered.

"Queenston, Ont., March 14, 1895.—I suppose I had better start at those borers as soon as the weather moderates a little. It is only about 4 above zero this a.m., a drop of about 35° since yesterday. What shall I try? I thought of scrubbing off the gum as soon as it softens and then applying the 'Saunders Wash' with carbolic acid added. Don't you think the acid would kill the bugs? Will it injure the trees? What would you advise? I want to kill the present stock of bugs if possible."

"I have my stock emulsion ready and as soon as I get a favourable day will drench the trees. Would you do it twice before the leaves appear, or would once do?"

"May 27.—The Peach Bark-beetles were at work pretty actively during those hot days before the late severe frost."

"July 15.—Replying to your very kind letter *in re* the 'Saunders Wash' and carbolic acid for the Peach Bark-borer, I used five pounds of washing soda and three quarts of soft soap, to this was added enough water to make about six gallons; air slaked lime was then added—sufficient to make it of the consistency of thick paint; to all this were added three tablespoonfuls of Paris green and one ounce of carbolic acid. It was applied with a whitewash brush, thoroughly covering the entire trunk of the

tree and a few inches up on the limbs. More Paris green could probably be used to advantage. I think, were this applied early in the season just as the borers begin their work, and then a month or six weeks later, it would check them completely."

"Nov. 21.—In reply to your very kind letter of the 19th inst., I may say that the satisfactory state of affairs regarding the Peach Bark-borer, reported on the 15th of July last, continued to the end of the season. The soap and carbolic acid wash for the Peach Bark-borer I only applied once, and it was by far the most successful of any of my experiments against these troublesome little pests. I think two applications would effectually check them. I am very glad indeed to be able to report thus."—C. E. FISHER.

BLACK PEACH APHIS.

(*Aphis persicæ-niger*, E. F. Smith.)

Early in August last, the first Canadian specimens which have come under my notice of the Black Peach Aphis, were sent in from Leamington, Essex county, Ont.

"Leamington, Ont., August 6.—Minute black insects have been found feeding on the roots of some of our newly or recently planted peach trees. They are in every way, except size, similar to the black aphis common on the leaves of cherry trees. Is this the Peach Aphis which is said to attack both leaves and roots?"

"August 13.—I herewith mail you specimens of root lice as per request. Are they not the peach-tree Root Aphis (*A. persicæ-niger*)? There are numbers of ants and flies like winged ants swarming around the roots affected. The trees assume a sickly yellow appearance, the leaves turn yellow and then die."

"November 18.—In this portion of Essex county we are going largely into the cultivation of the peach. I have 1500 trees, and this season there has appeared what is called the Black Peach Aphis. I noticed it first last spring on the roots of some young trees that had died. There was a large number of young trees died last spring and they were mostly all affected on the roots with the aphis. I see they are now on the branches of the trees in small clusters here and there. The trees are now bare of leaves and the insects on the branches are dormant."—JOHN M. READE.

"December 16.—I to-day mail you a few twigs with the Black Peach Aphis clinging to them as found on my trees. They are not nearly so numerous as they were a few weeks ago, when they could be seen in small clusters on the lower side of the small twigs on a large proportion of my trees. I had some difficulty in procuring these now."—WM. SMITH.

This injurious insect has been experimented upon extensively by the United States entomologists, particularly by Dr. J. B. Smith, of New Jersey, who has reached very satisfactory results by treating the form which attacks the roots with heavy dressing of kainit. Dr. Smith writes me as follows:—"December 26, 1895.—In our state, on light soil I advise about 10 lbs. of kainit per tree, covering the probable extent of the root system—this for a tree 4-6 inches in diameter and in bearing, the application to be made in spring—when the trees are leafing out. In our orchards the kainit has proved successful wherever used. Dr. Erwin F. Smith recommends ground tobacco and so does Prof. Alwood, of Virginia."

In his annual report for 1890, where Prof. Smith treats of the Black Peach Aphis at some length, he gives the following under the head of remedies:—

"The dealing with this insect above ground is easy. It succumbs readily to either the kerosene emulsion or the fish-oil soap, and the application of the insecticides to peach trees is usually not difficult, because of their moderate size. The young trees suffering most can usually be reached with the power afforded by a knapsack sprayer. In nurseries where this insect is working on the roots, I should recommend liberal periodical dressings of kainit. This will not only act as an efficient fertilizer, but will also serve to destroy many of the lice. The application should be made just before a rain if possible, so that the salts can be at once dissolved and carried into the ground. Wherever the solution comes into contact with the aphides it will kill them, and the salts will

remain until taken up by the plant. The application should be made when injury to the tree is noticed, *i.e.*, when they look sickly, refuse to grow without apparent cause, or when an examination shows the presence of the lice in the orchard.

"I have talked with a number of peach-growers and I am convinced that much of the specific effect of kainit as a peach tree fertilizer is due to its insecticide qualities in killing off the infesting root aphides. It has been found that when young trees refused to grow in old peach ground, a heavy dressing of kainit has mended matters radically, and a healthy young tree has been successfully grown."

THE NEW YORK PLUM SCALE.

(*Lecanium cerasifex*, Fitch?)

Attack.—When a tree is infested with this insect, large numbers of dark brown hemispherical, conspicuous scales, about $\frac{1}{6}$ of an inch long by $\frac{1}{8}$ of an inch wide and $\frac{1}{12}$ of an inch high, may be seen at all times of the year clustered along the small branches, particularly along the lower sides. The presence of this enemy upon a plum tree may be detected especially in July and August, and also in the spring, by the filthy black condition of the bark due to the growth of a fungus upon the copious deposit of honey dew which is emitted by the young scale insects during the time of their growth.

The first specimens sent to me of this insect came from Mr. W. J. Goodfellow, of Bramley, Simcoe Co., Ont., in April, 1894. Later in the same season its presence was detected in a few places in Niagara district. Prof. Panton writes: "Several specimens of Plum Lecanium have been sent to me this summer. It is rapidly spreading in Ontario, I have it from Niagara, Hamilton, Thornbury, Muskoka and on our own grounds." Mr. A. Lehmann sent specimens from Orillia of a *Lecanium* on apple, which is apparently the same thing, and I have recently received others from Mr. C. Newman, of Lachine, Que., who found these scales numerous on some of his plum trees. Early last spring a series of meetings was held at the request of the fruit-growers of Grimsby and Hamilton, and addresses were given at several points by Mr. Craig and myself upon the cultivation of fruit trees and their protection from injury by insects and fungi. I then found that this scale was much more widely distributed than had supposed, and specimens were brought to almost every meeting for information. Mr. L. Woolverton, the active Secretary of the Fruit Growers' Association of Ontario, who has exceptional facilities for getting information on such subjects, writes: "Nov. 6th.—The plum scale, *Lecanium cerasifex*, is slowly but surely making its way into our plum orchards. Last year I found two or three on some young trees which I had imported from the United States, but this year I found old scales here and there in different parts of my plum orchard. It is, therefore, evident that we must soon begin waging war against this insect very earnestly."

Its injuries in Canada have not been very serious so far; in only two orchards has it been discovered in alarming numbers and in both of these instances the prompt action of the owners has had the satisfactory result of entirely cleaning the trees of what might have been a cause of much loss.

Mr. G. E. Fisher, of Freeman, noticed this insect in his orchard in 1894, and although observing particularly this year "the large number of larvæ which came from a single scale and that everyone of these was pregnant and turned out larvæ in countless numbers," reports under date of December 24th: "I think they are not any more numerous than they were. I have not found any parasites at work, but many of the scales have apparently been worked upon. The scales I find on the trees this winter seem rather smaller than those of last year. I find them quite frequently on apple and pear trees. I have not sprayed with kerosene emulsion, but am glad to know they can be managed."

Mr. A. W. Peart, also of Freeman, Ont., writes in the same strain: "The 'Plum Scale' has not increased with me this year and as yet has not done any material damage."



Fig. 12. The New York Plum Scale: scales on a twig.

There is still some doubt among entomologists as to the correct name of this scale. Mr. L. O. Howard, writes "it has been lately decided by Mr. Newstead, of Chester England, that it is identical with the European *Lecanium prunastri* (L. O. Howard in *Some Scale Insects of the Orchard*, U. S. Dept. Agr. Year Book, 1894, p. 272). It is the same as the "*Lecanium* from Queenston, Ont." which was kindly examined critically and compared with *L. rugosum*, Sig., by Prof. Cockerell on pp. 58-61 of the *Canadian Entomologist* for 1895. It is also thought by some to be a variety of *L. juglandis*. The first references to the insect in horticultural literature were, I believe, under the name of *L. cerasifex*; so, until the matter is definitely settled by specialists, it seems well to speak of it under that name.

The life-history and habits of the species in America have been carefully worked out and described by Mr. M. V. Slingerland in his usual careful and complete manner in Cornell University Agricultural Experiment Station *Bulletin No. 83* (December, 1894).

The dates of the different stages of development of the scales as there described agree almost to a day with our Canadian observations.

The life-history may be summarised as follows:—

The male and female scale-insects mature about the middle of May (winged males issued May 13th to 19th from scales sent from Bramley, Ont.); copulation takes place and eggs may be found under the scales soon after. These do not hatch until the end of June, when the young larvæ crawl out on to the leaves and remain there until the autumn. About September most of them migrate back again to the twigs and branches of the tree, where they pass the winter. Prof. Panton writes from Guelph, Ont., on June 28th last: "To-day the young *Lecaniums* are on the move in thousands," and Mr. G. E. Fisher, writing from Freeman, near Hamilton, Ont., on June 29th, says:—"I have been much interested in watching the hatching of the Plum Scale (*Lecanium*). The larvæ have now all left the scales and gone out on the leaves." During the first season the scales increase but little in size, although they feed continuously and emit large quantities of honey dew; but when they revive the following spring, they move out on to the young wood and grow rapidly, and as stated above, full development is attained about the middle of May. The males are very small white and active two-winged flies with two long thread-like tails. The females are merely soft, yellowish, hemispherical objects with almost circular outline. About the end of May the egg-laying process is completed, and the outer surface of the female becomes hard and dry, forming a thin brown scale-like covering over the mass of eggs. This is not a true scale, *i.e.*, a waxy secretion, as in the case of the Oyster-shell Bark-louse and some others; but merely the dried skin of the female now dead.

The two instances referred to where the New York Plum Scale occurred in sufficient numbers to call for special measures, were in the orchards of Mr. C. E. Fisher, at Queenston, Ont., and Mr. W. M. Orr, at Fruitland, between Hamilton and Grimsby. The following letters give facts on the matter which will be of interest to fruit growers. On finding that Mr. Fisher's trees were badly infested, I asked him to carry out carefully Mr. Slingerland's suggestion of spraying the trees in winter with a strong kerosene emulsion wash.

"Queenston, Ont., May 27.—For the Plum Scale I sprayed twice before the leaves opened, with kerosene emulsion diluted four times. I have since examined carefully several times and think it has been a success. Will report again to you later. If it has not been perfectly effective in destroying them, I will spray again."

"July 15.—I examined my plum trees as you suggested in your last letter for the *Lecanium* Scales. There appeared to be no life in them. The two sprayings of kerosene emulsion diluted four times, applied at intervals of 10 days before the buds had opened, put on until the trees were thoroughly drenched, seem to have destroyed the scales completely. All appeared to be lifeless. I noticed on one tree before I applied the first spray, about two weeks before the buds opened, a few young larvæ moving about on the small twigs. This was only on one tree, on the sunny side. They must begin to move pretty early sometimes, although I could not detect any movement of them on the other trees. Of course, the emulsion would effectually destroy them. This leads me to conclude that it might probably be better to spray the second time, just

immediately before the buds open, with the strong mixture. After the leaves are out, I suppose it would be necessary to dilute nine times or more before applying the emulsion. However, the two applications seemed to do the work for me."

"November 25.—The treatment for the Plum Lecanium was particularly satisfactory. On making a careful examination a few days before I received your last letter, I could not find a single healthy scale on any of the trees."—C. E. FISHER.

Badly infested branches of St. Lawrence plum were sent from Fruitland by Mr. W. M. Orr, in April, and he was advised to spray at once with kerosene emulsion. At the end of the season Mr. Orr writes:—"Nov. 26.—We sprayed with kerosene emulsion for Plum Scale. We did it thoroughly, but only once. So far as we can judge, it has destroyed them. The old scales are all dead and dried up, and no signs of any more coming on the limbs."

Remedy.—All of our Canadian experiments with this insect were based on Mr. Slingerland's work in the state of New York, and where the instructions were carefully attended to the results were quite satisfactory. The kerosene emulsion (Riley-Hubbard formula) diluted with four parts of water used in the winter was most effective. Mr. Slingerland in his bulletin, lays great stress upon the necessity of thorough work; he says:—"Thoroughness must ever be the watchword in applying the emulsion. The scales when treated are very small objects and you must hit them with the emulsion. In making the application about July 1st, the only direction needed is to thoroughly soak the trees with the emulsion, diluted six to eight times. In combating the hibernating scales on the leafless trees, however, more care must be taken in directing the spray. Remember that most of the scales are on the undersides of the smaller branches, but there are thousands of them also in the crevices of the bark all over the tree, from the base of the trunk to the topmost twig. Thus in order to hit the scales, the spray must be directed from beneath the tree on all sides, and every crevice filled with the liquid. Drench every square inch of the bark. The horse power sprayers will not prove nearly so effective in fighting this pest as an ordinary hand pump and barrel or tank apparatus. You have got to stop at the tree, get under it, and stay at least a minute to do a thorough job. Remember where the scales are, which you want to hit, and do not leave the tree until they are hit. This idea of thoroughness cannot be too strongly impressed on the one who holds the nozzle while this pest is being fought."

The Best Time to Spray.—The remedy then is the standard kerosene emulsion diluted with four parts of water, to be applied twice before the buds burst, or diluted with eight parts of water just when the young scales are seen to be moving, i.e., in the last days of June.

Parasites.—This insect, like many other scale insects, is sometimes much reduced in numbers by parasites. From scales received from Mr. Alex. Glass, of St. Catharines, two species of chalcids were bred. These have been identified by Messrs. Howard and Ashmead as *Pachyneuron altiscuta*, How., and *Eunotus lividus*, Ashm. From other scales sent by Mr. Orr from Fruitland, three specimens of the small lady-bird beetle, *Hyperaspis signata*, Oliv., were reared. The white mealy larvæ, when they had eaten all the eggs beneath one scale, pushed their way beneath another and so on until they were full grown, about June 20. The beetles appeared early in July.

THE PEAR-LEAF BLISTER-MITE.

(Phytoptus pyri, Nalepa.)

Fig. 13.—Pear-leaf Blister: cluster of infested leaves; *a*, upper surface of leaf; *b*, lower surface; *c*, two galls enlarged. (Figure kindly lent by Prof. J. H. Comstock.)

Attack.—Reddish spots, irregular in shape, about $\frac{1}{8}$ of an inch in diameter, and frequently confluent. These appear on young pear leaves early in spring, and, as the summer progresses, they turn to corky, blister-like galls, with a hole in the centre, through which large numbers of minute, elongated mites issue, and attack fresh parts of the leaf.

Since special attention was drawn to this insect, and its habits were explained in my report for 1891, specimens and inquiries have come in from all parts of Canada where the pear is grown. Mr. L. Woolverton, the Secretary of the Fruit Growers' Association of Ontario, reports that "it is rapidly gaining ground in the Niagara district. On account of its small size and its habit of working out of sight between the upper and lower surfaces of the leaf, it is not recognized as an insect enemy by fruit

growers in general, many mistaking it for some fungous disease; but if one examines an affected leaf in a good light with a magnifying glass, it is easy to detect the white, elongated mites. I find it is spreading slowly through our pear orchards, and it threatens to do us much harm."

In British Columbia I found that this insect, although not sufficiently numerous at the time of my visit to be the cause of much injury, occurred in many orchards, and Mr. Palmer says it is becoming common in every part of the province. However, its nature is now pretty generally known by fruit growers, and the recommended remedies are being applied. Mr. Sharpe writes from Agassiz as follows:—

"Agassiz, B. C., May 9.—I have been interested in the Pear-leaf Blister-mite for two years and at one time was very much concerned about it; for it was doing serious injury to some of my pear trees, more especially those received from one of the Ontario nurseries. I think it would be well if you would give this matter your attention. I have every reason to believe that it is very prevalent on the Pacific coast, as I get trees and see trees from several nurseries in British Columbia, Washington, Oregon and California, and I think all have it, and the climate being very favourable to their development on account of the moisture and consequent very succulent character of the leaves and abundant foliage, it is likely, if not checked very soon, to cause a serious loss. Up to last spring the Oregon people say that they thought it was a leaf blight, and I suppose, if treated at all, it was treated with Bordeaux mixture or some other fungicide, which I found had no effect on it. I tried a lot of combinations last year, but all were failures. This March and February I used the sulphur and salt combination, and my pear trees never looked so strong and healthy. The foliage is almost uniformly clean and bright, and if a few colonies escaped, I think, if I do not succeed in clearing them out this summer, that another thorough spraying next winter will rid me of them."—T. A. SHARPE.

In my report for 1891, I recommend as a remedy for this insect the ordinary kerosene emulsion with the addition of some flowers of sulphur, to be used just before the buds burst, and this has given tolerably good results; but, from the condition of Mr. Sharpe's trees, which I had an opportunity of examining last summer, as well as from

information received from Mr. R. M. Palmer, I judge that the most successful treatment has been with the lime, sulphur and salt winter wash, recommended by the Oregon Board of Horticulture. This wash, Mr. Palmer tells me, has been extensively used in British Columbia and has given good satisfaction.

The formula, as given in the report of the Inspector of Fruit Pests of British Columbia for 1894, is as follows:—

“No. 1. (Winter spray for Woolly Aphis, Scale insects and Pear-leaf Blister-Mite.)

Ingredients: Lime, unslaked.....	30 pounds.
Sulphur, powdered.....	20 do
Salt, coarse.....	15 do
Water	60 gallons.

This wash is practically the same and is prepared in the same manner as the winter wash recommended by the United States Entomologist for the San José Scale, and printed in my last annual report as follows:—

“The most favoured winter remedy in California, however, is the lime, salt, and sulphur mixture. This consists of unslaked lime 10 lbs., sulphur 5 lbs., stock salt 5 lbs., water to make 15 gallons. This wash will do great damage to the trees if applied during the growing season, *and should be used only in winter*. All the sulphur and half the lime are placed in a kettle, and $8\frac{1}{2}$ gallons of water added; after which, the contents of the kettle are boiled briskly for about an hour. The solution, which at first is yellow from the sulphur, will turn very dark brown, assuming more or less of a reddish tint, and will finally turn from a thick batter to a thoroughly liquid condition, the product being ordinary sulphide of lime. All the salt is added to the remaining 5 pounds of lime, and the latter slaked; after which, the slaked lime and salt are added to the sulphide of lime already obtained, the whole being then diluted with water to make 15 gallons. This should be strained before application, as it does not form a perfect liquid solution, on account of the considerable quantity of undissolved lime, which will soon sink to the bottom, unless the solution is constantly stirred while being sprayed.” (L. O. Howard, *Circular No. 3.*)

SPRAYING.

Spraying for insect enemies and fungous diseases is now universally recognized by progressive fruit growers in Canada to be a necessary part of their annual operations. Remarkable success has attended the adoption of spraying as a regular orchard practice by many growers, and great gain has resulted in both the quantity and the much improved quality of the crop reaped. It is certain that during the past season the number of fruit growers who have sprayed is far greater than it ever was before. This is largely due to the efforts made by the Dominion and Provincial Governments to disseminate accurate information as to the nature of the injuries to crops and the best means of preventing them. In addition to the work of the Entomologist, an excellent series of experiments was carried on by my colleague, Mr. John Craig, in some fruit orchards of Western Ontario during the summer of 1894; and, during the past season, this same work was carried out on a much more extensive scale by the Ontario Government under the able direction of Mr. A. H. Pettit, of Grimsby, who visited at regular intervals about 30 localities in the province and experimented carefully on the advantages of spraying with the standard mixtures. The results of this work are satisfactory, as appears from the following answer to a letter of inquiry. The full report of Mr. Pettit's work will, of course, be submitted to the Ontario Government for publication.

“November 7.—In regard to insects and the results of the spraying, I can only give you the facts as they presented themselves to me during the season. I do not think the Codling Moth has been nearly as numerous as in former years, from some cause or other, and the damage to fruit on the sprayed trees is much less than on the unsprayed. The same seems to apply in regard to the Apple Scab. While there has been a little on the unsprayed trees, scarcely any can be found on the sprayed trees, and

the improvement in the foliage is quite marked; another point is, the fruit on the sprayed trees is larger in size, marking no doubt the health and vigour of the tree.

"I am inclined to think the frost at the time of blooming and followed by (in this western part of Ontario) a long continued drought has been detrimental to the development of the Codling Moth and also to the Black Spot fungus. The Bordeaux mixture, I believe, will prove to be of great value to our fruit growers, if they will only apply it promptly and at regular intervals, and for apple trees I would add the Paris green every time. The Bud Moth has been quite numerous this year in some sections, and the Paris green applied at the first and second sprayings might catch it as well, and the extra cost would be light."—A. H. PETTIT.

Good results have also been obtained by other correspondents :—

"Hillside, Chateauguay Basin, Que.—Spraying was started on the 28th April, 1894, on Duchess, Astrachan and all early apples. They were sprayed once before the blossoms opened and three times afterwards. The Duchess and all early kinds, were in full bloom on May 13th, and on the 24th there was a heavy rain storm that beat off the blossoms. We sprayed for the Curculio (The Plum Curculio, *Conotrachelus nenuphar*, Herbst. Several specimens were bred.—J. F.) May 26, and noticed some of the newly formed Duchess already bitten. June 26th we gave the fruit the last spraying. The Fameuse were first sprayed May 1st, also Golden Russet and other late apples. They were in full bloom May 15th, and we were prevented by rain from spraying until the 30th. The second spraying was June 6th, and the last was July 4th, at which time we omitted the Paris green. The Duchess and Yellow Transparent were sprayed principally on account of the Curculio, which had been very destructive the previous year. The Fameuse, Walbridge, Haas and other apples influenced by fungus growth were sprayed to prevent it, and the result was very satisfactory. We experimented on the Fameuse by leaving a row as a check among the sprayed trees, and there was from sixty to seventy per cent difference when they were sprayed four times, the check row being badly spotted, and foliage showing a marked difference, being yellow and spotted. A check row in a different part of the orchard had been left unsprayed the previous year, and we noticed that the fruit last season was not so good as where the trees had been sprayed. The Curculio did not do so much damage as the previous year, and there is no doubt the Paris green was a valuable help in its destruction. There was also great improvement in the Yellow Transparent. Our orchard contains about 3,000 trees of all sizes, and the past season we gathered about 1,400 barrels of marketable apples."—R. JACK.

"Freeman, Ont., Dec. 26.—Spraying is exciting more interest and gaining adherents year by year. I used the Bordeaux mixture combined with Paris green on my apple trees with satisfactory results. The fruit was clean, and the foliage, in spite of drought, kept in good condition.—A. W. PEART.

"Ayr, Ont., Jan. 26, 1895.—As you instructed me last spring, I sprayed my apple trees to destroy canker-worm, and it was a grand success. It cleaned them all off."—JOHN MCRUER.

One of the correspondents of the Ontario Bureau of Industries writes from Elmsley, Lanark :—"Fruit trees and vines look well. We may thank the bureau and college for it. I sprayed my trees and vines as instructed and am well paid."

"Victoria, B.C., Oct. 30.—Spraying with Bordeaux mixture against fungous diseases has been generally very successful, although I noticed that some of the sprayed fruit has been russeted a little."—R. M. PALMER.

All the above references have been about the advantage of spraying fruit trees to prevent loss from Mandibulate or Biting Insects. There are also remedies for the other large class of injurious insects, Sucking Insects, which injure crops by sucking the sap. For the most economical and effective means of applying these, the spraying pump is also necessary. The materials used are for the most part insecticides which kill by mere contact with the bodies, they may be classed generally as Summer and Winter Washes; the latter may be used much stronger than the Summer Washes, because, the trees being dormant, the danger of injury is lessened. The most injurious of these Sucking Insects are the various plant-lice or Aphides, true plant bugs and scale insects.

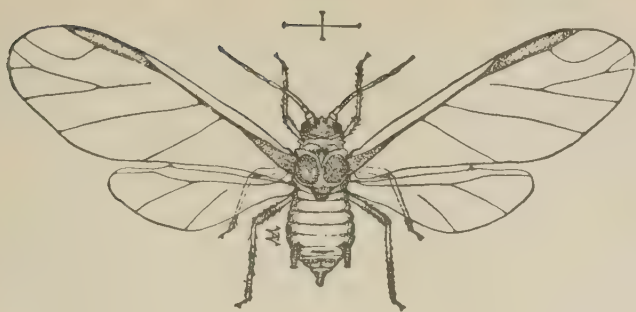


Fig. 14.—Apple Aphis: winged female.

THE APPLE APHIS (*Aphis mali*, L.) and Woolly Aphis are probably the two most injurious fruit insects in British Columbia, and are receiving special attention at the hands of Mr. R. M. Palmer, the Inspector of Fruit Pests, who has published in the *Fourth Report* of the Department of Agriculture of British Columbia (1894) valuable articles on diseases and pests of the orchard, garden and farm. In this report, receipts for spraying mixtures and instruc-

tions for their application are given, together with the latest information on the subject, gathered from outside sources. I found in conversation with British Columbian fruit growers during the past summer that kerosene emulsion, the standard remedy in the east for scale insects and plant-lice, was not at all popular, the English quassia hop wash or tobacco and soap wash being preferred, as shown in the following communications:—

“Victoria, B.C., April 4.—*In re* spraying mixtures, the Board of Horticulture have adopted certain formulas and placed them on their rules and regulations. The No. 1 Spray—Lime, sulphur and salt (see page 161)—is the one that has been most extensively used during the dormant season. A wash of one pound of concentrated lye to 5 gallons of water has also been freely used, and to some extent the lime, sulphur and blue vitriol wash. The kerosene emulsion has never become popular in British Columbia, partly on account of its cost, about 8 cents per gallon, and also because some injury has resulted to foliage from its use during the growing season. Our most successful summer spray for Aphides has been a mixture of whale oil soap or other soap (1 lb.), waste tobacco (4 lbs.) and water (10 gallons). This is a very economical mixture, as, so far, we have been able to get refuse tobacco stems and leaves from the cigar factories for little or nothing. I have found this wash very effective.”—R. M. PALMER.

“Agassiz, B.C., Oct. 21.—As to the quassia and soap wash for Aphis, this does not compare with the tobacco wash for cheapness, simplicity of manufacture or effectiveness. I have tried both under the same conditions and speak from a fair trial without prejudice.”—T. A. SHARPE.

“Kelowna, B. C., Dec. 24, 1894.—*In re* the Apple Aphis, we were much interested to hear you had complaints from other parties as to the Riley-Hubbard emulsion. We found that one of our neighbours, Mr. Crozier, who takes very good care of his trees, was not at all pleased with kerosene and soap, and had done much better with tobacco and soap, which, he declares, is surer and not so liable to damage the foliage. On the other hand, the horticulturist at the Coldstream Ranch (owned by the Governor General) tell us that he has had complete success with the kerosene emulsion used in the proportions of the original formula, namely, 9 to 1.”—ROSE BROS.

Having heard that Mr. T. T. Lyon, special agent of the United States Division of Pomology, at Southaven, Michigan, had been very successful with a tobacco wash for Aphides, I wrote and asked him for particulars of his treatment. His reply is as follows:—

“I fill a half barrel as full as convenient with tobacco stems, and turn on cold water sufficient to cover them, place strips of board on the top, with weights, so as to keep the tobacco submerged; leave it to digest about 24 hours, then strain, if needful, and apply with a spray pump and nozzle. With me, it has always been a sure antidote for sucking insects like Aphides, as well as slugs.”

THE WOOLLY APHIS (*Schizoneura lanigera*, Hausm.) occurs more or less all over Canada, but is apparently increasing in British Columbia. Mr. G. A. Knight has reported it as present to a certain extent for several years, but during this autumn I have received many letters of inquiry from the Pacific province. Mr. Palmer writes: “October 30.—You will be sorry to hear

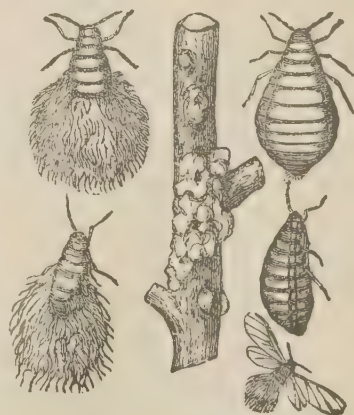


Fig. 15.—The Woolly Aphis.

that the Woolly Aphis is very troublesome again this fall, most of the orchards in Victoria and vicinity, and the wild 'crab apple' bushes, are hanging white with the pest. Of course some people are saying that spraying against it has been of no use, because the work that was done did not exterminate the aphides. I hope to get lots of spraying done this fall and winter."

There are two forms of this insect, one of which attacks the trunk and branches of the apple tree (Fig. 15 shows this form, twig and winged female natural size, the other figures enlarged) and the other which does much injury to the roots. When occurring on the trunks it is not a very difficult matter to destroy the Woolly Aphis with kerosene emulsion or any of the other washes for Sucking insects, but the root-inhabiting form is extremely hard to control, owing to the great difficulty of reaching with any liquid remedy the whole root system. Remedies which have been proposed are the use of hot water or soap-suds poured around the roots, after some of the soil has been removed. Refuse tobacco powder, hoed in around the roots, is also recommended. In view of the successful results obtained by Prof. J. B. Smith with kainit, it will be well to try experiments with that material in places where the Woolly Aphis may be found injuriously prevalent. Another method of avoiding loss from the attacks of this insect and which should also be tested, is the use of resistant stocks. In the "*Handbook of Destructive Insects of Victoria*," Australia, by Mr. C. French, the Government Entomologist, the following reference is made to this:—

"Before the advent of those excellent blight-proof stocks, the Majetin and Northern Spy, it was exceedingly difficult to find, in most orchards, an apple tree that was clean or in perfect health; now, with a little care and attention, the fruit grower, as a rule, may snap his fingers at the 'American Blight,' as, even if it should appear, it can now be kept within reasonable bounds, if not stamped out altogether. * * * According to the late Mr. Treen, the first systematic experiments with the non-blighting stock, the Majetin, were carried out by Messrs. T. Lang & Co., the well known nurserymen of Melbourne and Ballarat, in 1868-70. * * * The variety called the Northern Spy, was raised in America, and was also introduced here by Messrs. Thos. Lang & Co. It is said to be superior in every way to the Majetin, and but little else is now used on which to work young trees of the apple."

The above, of course, all refers to Australia.

Some work has been done in California in the direction of grafting on resistant stocks. In an article on *Beneficial Insects*, by Mr. J. F. McIntyre on page 1070 of the *Fourth Report* of the Department of Agriculture of British Columbia, the following occurs:—

"The Woolly Aphis has done extensive injury to the apple trees in Ventura county, infesting all kinds except those grafted on pear roots. If we can keep the aphis out of the ground by grafting on resistant roots, it will not be very difficult to keep the trees clean."

HOUSEHOLD PESTS.

THE CARPET BEETLE OR "BUFFALO MOTH."

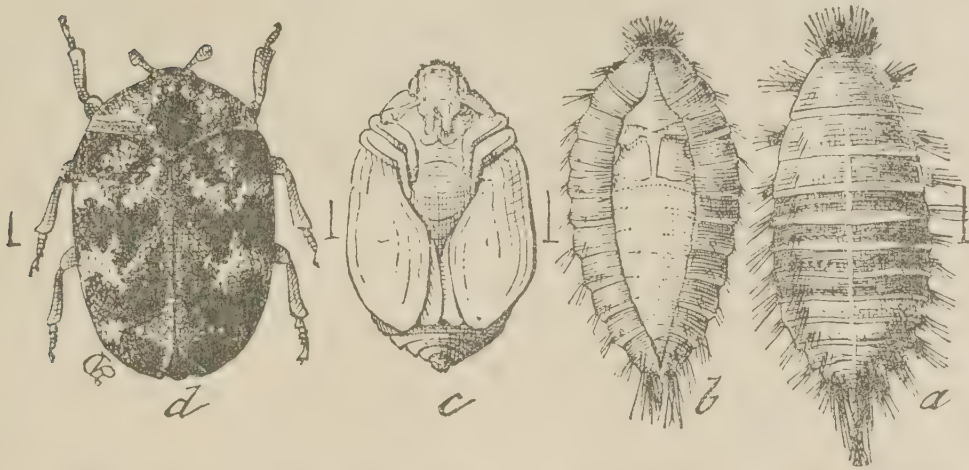
(Anthrenus scrophulariæ, L.)

Fig. 16.—The Carpet Beetle: *a*, larva dorsal view; *b*, do ventral view; *c*, pupa; *d*, adult—all enlarged.

Attack.—Very active, dark brown, bristly insects about one-eighth of an inch in length, shaped as in figure 16 *a*, which during summer eat the woollen portions of carpets, particularly around the edges of rooms, and where they are nailed down.

The Carpet Beetle has occasionally been reported to me as being injurious to carpets since 1889, when the first mention of it in Canada, in that connection, was made. Previous to that, however, specimens of the beetle had been received among insects sent in for identification from various places, as Fort MacLeod, N.W.T., Leamington, Brantford, Toronto and Peterboro, in Ontario, and in 1884 a few specimens were found in the windows in the library of Parliament, Ottawa.

During the past season there have been more inquiries for information than ever previously, and I fear this pest must be extending its range as a household pest. Last year Mr. R. Alexander wrote to me from Galt, Ont., under date of July 24th:—"Please find inclosed an insect known here by the name of 'Buffalo Moth,' which is causing house-keepers a great amount of anxiety and trouble because of its numbers and destructiveness to carpets and woollens. Will you be kind enough to advise me how to destroy it?"

During the past summer injuries have been reported from Paris, Brantford and Hamilton, and Prof. J. H. Panton, also writes:—"Guelph, Ont. Dec., 5th.—I have had specimens of the Buffalo Carpet Beetle sent to me from Hamilton, Guelph City, and a farm house about five miles from Guelph. I have found them in my laboratory, and I think I have received some from Brantford. There is no doubt it is here."

Many articles have appeared upon this insect since its first occurrence as a house pest in 1874. By far the best of these are those by Dr. J. A. Lintner (*Ent. Contributions*, No. 4) and Dr. C. V. Riley (*Insect Life*, II., p. 127).

The life-history of this insect in Canada is probably as follows:—The perfect beetles emerge either in autumn or more abundantly in spring, at which time they pair and lay eggs, from which hatch the larvæ that do the harm during the summer. There is, I believe, only one brood in the season, although I have received pupæ in one instance as early as the 24th July. The beetle is a beautiful little creature, oval in shape, one-eighth of an inch in length by one-twelfth of an inch in width; in colour, black, variegated with three irregular bars of white scales, and with the edges of the wing-cases, where they meet on the back, bordered with brilliant scarlet.

Remedies.—This is a very difficult insect to eradicate when once established. Dr. Riley speaks of it in the article above referred to as the “despair of the good house-keeper”, and also says, “Where carpets are used and only taken up once a year, at ‘house-cleaning,’ the conditions are very favourable for the insect’s increase, particularly where the house-cleaning is hurriedly and carelessly done. When a house has once become infested, nothing but the most energetic measures will completely rid it of the pest, and in complete riddance is the only hope, as in a year a very few individuals will so increase as to do great damage. At house-cleaning time, then, as many rooms as possible should be bared at once, and the house-keeper should go carefully over the rooms, removing all dust, and with a hand atomizer charged with benzine should puff the liquid into all the floor crevices, etc.; the inflammability of benzine must be remembered, however, and no light brought near it for some hours.” Gasoline or refined kerosene would answer as well as benzine. Good work can also be done by removing the carpets, having them well beaten, and scalding the floor with boiling water before replacing them. Before relaying the carpets, if a strip two feet wide of ordinary builders’ tarred paper be placed round the edges of the room, it will, to a large measure, prevent the beetles from laying their eggs. Cloth covered furniture, and chests of drawers which have held infested clothing, should also be thoroughly treated with benzine or gasoline. In places where this pest is known to occur, woollen fabrics and other articles liable to be attacked should be examined and shaken out at short intervals.

It is sometimes inconvenient to take up carpets, in order to examine them to see if the beetles are present. For such cases Dr. Riley has suggested the following plan, which has given good results where tried:—

“Another method of treatment, which I have frequently recommended and which can be used to advantage whenever the work of the larvæ is noticed or suspected, consists of laying a damp cloth (an old towel or a folded sheet) smoothly over the suspected part of the carpet, and ironing it with a hot iron. The steam thus generated will pass through the carpet and kill all the insects immediately beneath. If not too laborious, an entire room could be gone over to advantage in this way.”

Mr. C. H. Roberts, dispensing chemist, of Paris, Ont., who is frequently applied to for advice as to the best treatment for injurious insects, has recommended this last plan to some of his friends, and writes:—

“Paris, Ont., December 24.—I have to thank you for the very prompt and courteous reply to my inquiry *in re* the Carpet Beetle or Buffalo Moth. This pest has been spreading from house to house in this vicinity quite rapidly and in some cases has proved most disastrous to the carpets of many of our best houses. It has a preference for red and in some cases eats only the red portions, thus leaving the carpets riddled; it also seems to prefer darkness rather than light. Your prescription of putting a damp cloth around the edges of the carpets and ironing with a very hot iron, seems to answer well, if used at the proper time, and thoroughly. One lady remarked ‘it is just splendid and I think has destroyed them all in our house.’

“It is astonishing how much damage is done sometimes before people know there are any of these pests in the house. I have known a lady to say she was positive there were none in her house, and on investigation she found them quite plentiful.

“Your department is a great boon to the public, where reliable information can be obtained promptly and gratuitously on all subjects connected with injuries by insects to farm crops and other property for the small trouble of asking for it.”—C. H. ROBERTS.

“Toronto, Ont., December 31.—Mrs. Beadle tells me that, when on a visit to her sister, residing in Springfield, Mass., she heard the ladies complaining of the Carpet Beetle eating wearing apparel in drawers and closets, not only those of wool, but also those of silk, and even eating numerous holes in papers in their drawers; also that people availed themselves of its preference for red woollen fabrics, to trap them, by placing pieces of red flannel in drawers and closets, and that in this way, large numbers of the insects had been found and destroyed.”—DR. D. W. BEADLE.

THE APIARY.

The practical management of the Apiary during the past season has been satisfactorily carried on under my supervision by Mr. John Fixter, the Farm foreman, an enthusiast in bee-keeping. Mr. Fixter has been of great service and has devoted much of his own time after hours to the careful work which is necessary to make the keeping of bees a success. He has also attended some meetings and explained the operations now in progress at the Experimental Farm. The interest in this subject has been shown by the large number of visitors at the Apiary. The 23 colonies of bees are in good condition and on November 20th were stored in the cellar prepared for them. A report by Mr. Fixter upon the working of the bees during the season is printed herewith and, I feel sure, will be of great interest to bee-keepers. The same experiments which were begun at the suggestion of Mr. R. F. Holtermann, of Brantford, Ont., and reported upon last year on different kinds of comb foundation, were continued during the present season, and a valuable report upon them by my colleague, Mr. Frank T. Shutt, will be found appended to this report. This investigation is one of great value to bee-keepers, and I feel sure that Mr. Shutt's report will be found a valuable addition to the literature of bee keeping.

REPORT OF MR. JOHN FIXTER.

EXPERIMENTS IN WINTERING (1894-95).

Twenty colonies of bees were put into the cellar November 9, 1894. The bee cellar is a chamber 10 feet by 12, boarded off from a large stone cellar; the floor is boarded and there are no shelves. In the autumn of 1894, the hives were packed as follows:—A row of empty hives was first arranged around the wall, and the hives containing bees were put on the top of these so that they might not be too close to the floor. To secure ventilation, a piece of wood 3 inches thick was placed on the top of the empty hives at the back beneath the full hives; the bottom boards of the latter were loosened, and a $\frac{3}{8}$ of an inch block was also inserted between the bottom board and the brood chamber; the front entrances being left wide open. Thus the upper or second tier of hives was $3\frac{3}{8}$ inches higher at the back than in front. The wooden covers were removed from the hives and replaced by two common grain bags. This year cushions 4 inches thick and filled with chaff, have been used in place of these bags. Of the 20 colonies, 19 hives were arranged on the plan above described. All kept perfectly dry, but considerable humming was heard from the bees during the winter. One hive was put in the cellar with both wooden cover and propolis quilt on the top, and the bottom board left tightly attached; in fact, the hive was taken in just as it was in the bee yard. This hive was quite damp during the winter and some mould was noticed on the comb. Although the bees in this case wintered safely, this plan of wintering is not recommended. The average weight of each colony and hive when put in the cellar on November 9, 1894, was $48\frac{3}{4}$ pounds, and when taken out again on April 19, 1895, the average weight was 36 pounds and 3 ounces, each colony having only consumed an average of 12 pounds and 9 ounces of their stores against 20 pounds during the winter of 1893-94. This improvement was probably due to the higher average temperature maintained in the cellar during the winter and a better method of storing the hives.

The temperature of cellar expressed in degrees Fahrenheit was:—

November.....	38° to 42°	February.....	38° to 40°
December.....	do	March.....	40° to 42°
January.....	40° to 42°	April.....	42° to 46°

From 40° to 46° is claimed to be the proper average temperature to winter bees at; but we were unable to obtain this temperature throughout the winter in our cellar.

From an unknown cause, one colony died during the winter, although well supplied with sealed honey.

THE SEASON OF 1895.

April 18, 1895.—The weather being very fine, 6 hives were taken out of the cellar and placed on their summer stands in the bee yard. The remaining 13 hives were taken out on the morning of the 19th. All the colonies appeared to be very unsettled, and in the evening of the 19th a considerable number of dead bees were noticed around the six hives put out first on the evening of the 18th.

April 20.—Very strong wind. All colonies still unsettled. Temperature, 60° to 70°. I noticed that three small colonies which had purposely been put into winter quarters, weak in numbers, to see if they could be carried through the winter, had gradually dwindled, and the hives were forsaken.

" 21.—Very few bees carrying in pollen.

" 22-25.—Weather very cool. The bees did not come out at all. On the 26th they began to fly, but none were noticed carrying pollen.

" 27-29.—Very fine weather, Bees flying well and collecting pollen freely from soft maples. Very few willows in blossom yet.

" 30.—Morning opened cold and dull; but the afternoon was bright and the bees worked well on elms and willows.

May 1-4.—Bees flying well and gathering much pollen.

" 5.—Fine warm day. Bees working well. Noticed the bees beginning to cluster in front of one hive.

" 8.—Wet all day. No bees flying.

" 10.—Fine day. All colonies appeared to be working well. All hives inspected. Found abundance of brood. Some young bees coming out. A good quantity of fresh honey gathered. Found a few grubs of the Bee-moth (*Galleria mellonella*, L.) in one hive and at once destroyed them all.

" 11.—Fine day. Bees working well, cool towards evening.

" 12-13.—Very cold. Bees did not come out at all. It froze hard at night.

" 14.—A good deal of dead brood was carried out in front of several hives. Bees noticed clustering around water tap.*

" 15-16.—Bright and sunny, but very cold wind; very little working. A considerable amount of dead brood and young bees in front of every hive.

" 17-18.—Bright and sunny, but a cool wind; bees working fairly well.

" 19-21.—Wet, cold, and dull; very windy, very little flying.

" 22.—Cold, but beginning to get warmer,

" 23-24.—Very fine; bees working well.

" 24.—Inspected every hive; a considerable amount of new honey and brood, except in one colony which was very weak. Later, this colony was united with a new swarm from one of the other hives.

" 25-29.—Very fine weather. Bees working well.

" 29.—First swarm of the season.

" 30.—Fine till evening, when very heavy rain fell. Bees clustering around nearly every hive.

" 31.—Very wet. Bees did not fly until evening.

June 1.—Very fine. Bees working well. Placed first set of supers on all the hives except the weak colony mentioned above.

" 2.—Fine; bees working well, but still clustering.

" 3-5.—Rather dull, but bees working well; all clustering ceased.

" 6.—Rather dull; very little flying. White clover and Alsike coming into bloom.

" 7-10.—Very fine; bees working well.

" 11.—Mock Orange (*Philadelphus*) in full bloom and very attractive to bees.

* It must be remembered that bees require a good deal of water to drink, and when there is not a creek or pond near at hand, where a supply of good fresh water can be obtained, this want must be supplied by the bee keeper.

June 20.—A considerable amount of clover honey in the sections.

" 21.—Wet all day ; bees working fairly well.

" 22-26.—Weather very fine ; a large amount of clover honey gathered.

" 27-30.—Bees working well on clover blossoms which are now abundant.

July 1.—Basswood flowers fairly well opened ; bees working well. All hives examined. Several supers full of clover honey ; combs well capped. Each of these was marked and an empty super inserted below it, so that the bees might go on working, and the full super being on the top, it would not get travel-stained by the bees passing over it, and the honey would ripen to a certain extent.

" 2-15.—Bees working well on clover and basswood.

" 15.—All supers full of honey removed.

" 15-18.—Bees working well. Basswood just about finished.

" 18.—Buckwheat, plot No. 1, in bloom ; bees working well on it and clover, which is still in bloom.

" 23.—Bees collecting much honey from English horse-beans.

" 23-31.—Very fine weather for bees ; working well on clover, buckwheat and horse-beans. Buckwheat, plot No. 2, came into bloom.

Aug. 1.—Much buckwheat honey in supers.

" 1-15.—Bees working well on buckwheat plots 1, 2 and 3 ; and a good supply of buckwheat honey in supers.

" 17.—Considerable clustering, owing to the excessive heat. . Made spaces for ventilation, between super and brood-chamber, just wide enough only to prevent bees getting through, and also put an extra wooden cover on the top of the hives for shade.

" 18.—Buckwheat plot No. 1 out of bloom ; but bees are working well on plots 2 and 3 now well in blossom ; plot 4 just coming into flower.

" 19-25.—Bees working well on buckwheat.

" 21.—Slight frost at night, not enough to injure buckwheat.

" 25.—Bees first noticed killing drones. Some bees seen attempting to rob ; as soon as this was observed, the entrances to the hives which were threatened, were closed up, so that only one bee could enter at a time.

" 25-31.—Bees still working on buckwheat, also on *Hydrangea paniculata*.

Sept. 1-11.—Bees working well on buckwheat plots 2, 3 and 4.

" 11.—Plot 2 ploughed under as green manure.

" 15.—Very hard frost ; buckwheat all frozen.

" 15.—Bees flying well. Removed all supers.

" 17-30.—Very fine weather ; bees flying well ; did not notice them gathering honey.

Oct. 1-6.—Very fine weather ; bees working on alsike and crimson clover.

" 7-18.—Weather cold and windy ; bees active when the weather was not too cold.

" 19-22.—Cold and dull ; 3 coarse sacks placed on each hive.

" 23-26.—Days bright ; but little flying.

" 27.—Very fine day ; bees showing a tendency to rob each other ; so closed entrances.

" 28-31.—Cold and windy ; no flying.

Nov. 1-14.—Cold ; very little flying.

" 15-18.—Very fine weather ; considerable flying.

" 19.—Dull and cold.

" 20.—Very cold windy day, freezing hard. Bees were put into winter quarters at night.

BUCKWHEAT.

Four plots of buckwheat were sown on the Experimental Farm last season, primarily as pasture for the bees but also for the grain. The plots were sown on sandy loan where there had been a plantation of forest trees and shrubs for the 5 years previously. No manure of any sort was used.

Plot No. 1.—Sown June 16th ; came up 23rd, came into bloom July 18th. The bees began to work on this plot as soon as the blossoms appeared, which was rather early, as the bees were still gathering clover honey. If the buckwheat had been sown

a week later, the bees, this year, would have had more white honey. Seed ripe August 29th; yield 27 bushels 16 lbs. to the acre, notwithstanding that the blossoms were somewhat injured by the excessive heat about the middle of August and late in the season.

Plot No. 2.—Sown June 29th; came up July 5th; in bloom July 31st, when the bees began at once to work on it. Ploughed under for green manure September 11th, when seeds were beginning to form.

Plot No. 3.—Sown July 6th; soil part sandy, part clay; that sown on the clay did not do well; the soil being too dry, the seed did not germinate readily. Came up on the sandy portion July 13th; in bloom August 12th. Bees began to work on it at once. Frozen down by the sharp frost of September 14th, when the seeds were ripening nicely; yield, 21 bushels 37 lbs. to the acre.

Plot No. 4.—Sown July 16, came up July 21, in bloom August 20. Bees busy on the plot until frost of September 14. No ripe grain, so ploughed down for manure Sept. 15.

FIVE-BANDED ITALIAN QUEEN.

The five-banded Italian queen, which was introduced Aug. 4, 1894, has given the best satisfaction. This beautiful queen bee was presented to the Apiary through Mr. R. F. Holtermann, Secretary of the Agricultural and Experimental Union of Ontario. The colony came out of winter quarters very strong in the spring of 1895. During the season of 1895 these bees made 78 sections of honey and swarmed twice. The colour of this race of bees is very beautiful. I should like to see many more colonies of them in the Apiary.

RETURNS.

The returns of the Central Experimental Farm Apiary for the season of 1895 show an average of 54 sections of honey for each colony.

Swarming for the season on the whole has been satisfactory. As stated above, the first swarm for the season was secured on May 29.

EXPERIMENTS IN WINTERING (1895-96).

No. 1.—Seventeen colonies put into winter quarters in the cellar. Empty hives were placed on the floor, with 3-inch blocks of wood on the top of them, and the hives piled up three tiers in height. In addition to the 3-inch blocks, by which the back was raised higher than the front so as to give free ventilation, each hive is raised from its own bottom board with small blocks, $\frac{3}{8}$ inch in height. All front entrances left wide open. The wooden covers of all these hives removed and replaced by chaff cushions, four inches thick. Above the cushions strips of wood were placed so as to prevent them touching the bottom of the hive immediately above them, and also to allow air to circulate freely under each tier of hives.

This plan was recommended to us by Mr. Pettit of Belmont, Ont.

No. 2.—Two colonies were put into the cellar, with the tops and bottoms left on, just as they were brought in out of the bee yard. These are to be watched for dampness, to be weighed in spring, and notes are to be kept of their work during the following season.

No. 3.—One colony was placed in a packing case in the cellar and packed with four inches of dry sawdust all round the hive; brood chamber raised from bottom board by four small 1-inch blocks; wooden cover of hive replaced by a 4-inch chaff cushion, and the packing case filled up with four inches of dry sawdust, above the cushion. For ventilation a small shaft, of the same size as the opening to the Langstroth hive, leads from the hive to the outside of the packing case. Case placed on the top of another case three feet high, in the stone cellar beneath dwelling house.

No. 4.—This experiment is very similar to the last, but no ventilation is provided. The bottom board of the hive was removed and the hive was stood on four blocks $1\frac{1}{2}$ inches high, one under each corner, placed right on the bottom of the packing case, which was then filled in with dry sawdust, four inches all round and above, as in experiment 3, except that no shaft for ventilation was cut through to the outside of the packing case; but immediately beneath the hive there is a narrow crack between the boards of the packing case, not $\frac{1}{16}$ of an inch wide. The packing case itself is raised about an inch off the earthen floor in the stone cellar by means of small blocks.

No. 5.—One colony was placed in a packing case large enough to allow of 4 inches of cut straw and chaff being packed all round the hive, and the box was left out of doors in a sheltered place on the ground in the yard. Bottom board loosened and 1 inch blocks put at each corner between bottom board and brood chamber. Wooden cover also replaced by 4 inch chaff cushion, and box filled up with 4 inches of chaff and cut straw. No ventilation.

No. 6.—One colony treated exactly as above, but with ventilating shaft from entrance to the outside of the case which is placed 3 feet from the ground on the top of an empty case.

JOHN FIXTER.

REPORT UPON FURTHER EXPERIMENTS WITH CERTAIN BRANDS OF "FOUNDATION."

BY FRANK T. SHUTT, M.A., F.I.C., F.C.S.

Last year a series of experiments was undertaken in order to ascertain the relative ease with which various brands of "foundation" were drawn out and used by bees in building comb. The results of these experiments and deductions therefrom were published in the report for 1894 (pages 220 to 223.) During the past summer this investigation has been continued, and the results obtained are now presented. In addition to the "foundations" tested last year, several new brands were put under trial. The relative weights of wax deposited when the honey was gathered from clover and buckwheat respectively, were also determined. The series also is more complete, inner and outer sections in all cases being examined.

The plan of procedure was as follows:—The frames were filled with the various "foundations" under experiment and of which the exact weight of two inches square had been taken. At the close of the season the cells were opened by the careful removal of the cap, and the honey extracted with the extractor. The last traces of honey were got rid of by successive exhaustions with cold water. After allowing the comb to thoroughly dry by exposure to the air, an area of two inches square was cut from the centre of the section. This method is practically the same as that used last year, with the exception that the caps of the cells only were removed. In the season of 1894 the cells were opened by shaving off the surface of the comb, a plan that necessarily involved the loss of more or less of the cell wall.

The data obtained are detailed in the following table :—

EXPERIMENTS with various Brands of "Foundation," 1895.

Designating Letter.	Name of Wax and Mill.	Section.	Milling Temperature.	Weight in grammes of "Foundation," 2 inches square.	Weight in grammes of empty honey-combs, 2 in. square.	Weight in grammes of wax added by bees per 2 in. square.	Percentage of wax added by bees.	Gathered from
			F.					
A 1	Choice wax, Root mill,.....	Outer.....	89°	1·401	2·969	1·568	111·9	Clover.
A 2	" " ".....	Inner.....	89°	1·401	3·108	1·701	121·4	"
B 1	" " ".....	Outer.....	120°	1·204	2·968	1·764	147·3	"
B 2	" " ".....	Inner.....	120°	1·204	2·906	1·702	141·3	"
C 1	Foundation in general use, 1894,.....	Outer.....		1·414	2·946	1·532	108·4	"
C 2	" " ".....	Inner.....		1·414	2·973	1·559	110·2	"
D 1	" " " 1895,.....	Outer.....		1·215	2·655	1·440	118·5	"
D 2	" " ".....	Inner.....		1·215	2·588	1·373	113·0	"
D 3	" " ".....	Outer.....		1·215	3·258	2·043	168·1	Buckwheat.
E 1	Heavy sheet, Root mill,.....	Inner.....	120°	1·315	2·707	1·392	105·8	Clover.
E 2	" " ".....	Outer.....	120°	1·315	2·685	1·370	104·2	"
F 1	Inferior wax, ".....	Inner.....	89°	1·224	3·006	1·782	145·6	"
F 2	" " ".....	Outer.....	89°	1·224	3·046	1·822	148·8	"
G 1	" " ".....	Inner.....	129°	1·167	3·024	1·857	159·1	"
G 2	" " ".....	Outer.....	120°	1·167	3·028	1·861	159·4	"
H 1	Choice wax, Given process,.....	Inner.....		1·801	3·513	1·712	95·0	"
H 2	" " ".....	Guter.....		1·801	3·372	1·571	87·2	"
I 1	Poor wax, ".....	Inner.....		1·582	3·176	1·594	100·8	"
I 2	" " ".....	Outer.....		1·582	3·275	1·693	107·0	"
I 3	" " ".....	Inner.....		1·582	3·453	1·871	118·2	Buckwheat.
I 4	" " ".....	Outer.....		1·582	3·441	1·859	117·5	"
J 1	Patent process, 12 sq. ft. per lb.....	Inner.....		1·004	2·515	1·511	150·5	Clover.
J 2	" " ".....	Outer.....		1·004	2·497	1·493	148·7	"
J 3	" " ".....	Inner.....		1·004	3·406	2·402	239·2	Buckwheat.
J 4	" " ".....	Outer.....		1·004	3·360	2·356	234·6	"
K 1	" " 15 sq. ft. per lb.....	Inner.....		1·093	2·818	1·725	157·8	Clover.
K 2	" " ".....	Outer.....		1·093	2·757	1·666	152·4	"
K 3	" " ".....	Inner.....		1·093	3·355	2·262	207·0	Buckwheat.
K 4	" " ".....	Outer.....		1·093	3·091	1·998	182·5	"
L 1	Foundation sent by R. F. H., 1895... ..	Inner.....		1·257	3·495	2·238	178·0	Clover.
L 2	" " ".....	Outer.....		1·257	3·016	1·759	139·9	"

Comparing these results with those of last year, the most notable feature to be observed is the fact that the weight of two square inches of the empty honey comb is greater than that recorded in 1894 for the same brand. This, I believe, is due entirely to the different methods employed this year in opening the cells, and not to any extra deposition of wax by the bees. The extra weight obtained this season represents, undoubtedly, the part of the cell wall that was shaved off in 1894 before the extraction of the honey. The weight of the "foundation" supplied being the same as that quoted in 1894, the percentage of added wax necessarily appears to be higher.

Respecting the relative amount of wax added by the bees in the inner and outer sections, it would seem that slightly more wax is deposited in the cell walls of the outer sections; but this does not hold good in all cases, and, where present, the additional amount is not large. The data, in my opinion, do not afford sufficient proof of the contention that the comb is heavier in the outer than in the inner sections, to allow such a conclusion to be drawn.

As shown last year, the percentage of wax produced by the bees is, as a rule, inversely proportional to the weight of wax supplied in the "foundation." This statement does not affect the fact that a heavy "foundation" is often continued by the bees by a heavy deposition of wax in the side walls of the cells.

In every instance where the same foundation was used for honey gathered from clover and from buckwheat, it was found that the wax deposited by the bees to contain the

THE BEE-MOTH.

(Galleria mellonella, L.)

The honey-bee has several insect enemies which prey upon it or its products. The most troublesome of these, as far as the bee-keeper is concerned, is the insect figured here in its different stages, which is too well known to bee-keepers to require more than

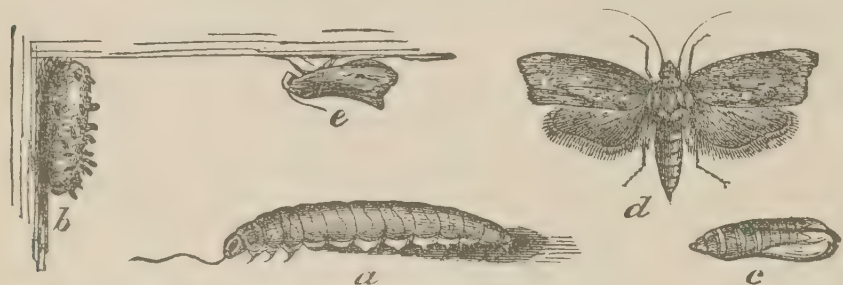


Fig. 17.—The Bee-moth: *a*, caterpillar; *b*, cocoon; *c*, pupa; *d*, a female moth with expanded wings; *e*, a male moth at rest.

a brief description. At *a* is shown one of the full-grown caterpillars or "grubs" natural size. They are very active, dirty white, fat caterpillars, when full-grown about an inch in length, which sometimes occur in large numbers in neglected hives and eat long galleries through the comb, feeding on the wax and the

bee-bread in the cells, and also, according to Dr. Riley, destroying any young bees that come in their way. The eggs are very small, oval, glistening white at first, but turning pink before hatching; they are pushed by the mother moth into any crack or crevice in or about the hive, by means of a long tube-like ovipositor. As soon as the young caterpillars hatch, they begin to spin as a protection a silken tube in which they live during their whole larval life and which is enlarged and extended as they progress. When full-grown, they leave these tubes and creep into any crevice or corner, generally near the bottom of the hive, where they spin a tough cocoon (Fig. 17 *b*) of white silk mixed with pellets of black excrement. The pupa (Fig. 17 *c*) may be found inside the cocoon. The perfect insect is figured natural size at *d*, a female with the wings expanded, and *e*, a male at rest.

There are normally two broods in the season, the first appearing in May and the second, usually much more numerous, in August. In infested comb brought into a heated office for study, the moths appeared at the end of March and through April well into May.

The moths are of various tints of dusky gray and differ a good deal, some being much lighter than others and some specimens of both sexes being of a more ruddy brown. They are very inconspicuous when at rest and in colour resemble very closely old weathered wood, a resemblance which is heightened by many dark spots on the wings. The peculiar shape of the wings, as is shown in the figure above, will easily enable anyone to identify this insect. The moths are about three-quarters of an inch long, and when at rest the wings are folded so as to leave a narrow, flat space at the top and then slope downwards abruptly; when disturbed, they run with great rapidity and slip quickly beneath any available shelter. They fly with ease and enter beehives about dusk in order to lay their eggs.

The indications of the presence of the Bee-moth grub in a hive are well known to most bee-keepers. If the little black pellets of excrement like small grains of gunpowder mixed with bee-bread or broken cappings are at any time noticed on the bottom board around the entrance, the hive should be at once carefully examined, and steps taken to remove any caterpillars that may be found. If attended to promptly while the grubs are few in number, this is an easy matter; but, if they are neglected and allowed to increase as they will very rapidly in the spring, much destruction will be wrought in a surprisingly short time.

When a grub is detected, it should be picked out with a knife or other sharp instrument (a pair of fine but stiff tweezers will be very convenient) and crushed. There will of course be some injury to the comb, but this the bees will soon repair. When the grubs occur only in small numbers, the bees will, as a rule, if the colony be of proper strength, keep them down themselves. The following extracts are confirmatory of this and will be found to contain much other information of interest to bee-keepers.

"It should invariably be borne in mind that a strong stock of bees is ever capable of resisting, to a great extent, the attacks of the worm, while a starved or queenless swarm is quite indifferent to its attacks. In a common box hive, a good way to entrap the worms after they are once in a hive, is to raise the front upon two small wooden blocks, and put a piece of woollen rag between the bottom board and the back of the hive. The worms find a cozy place under the rag, in which they form their cocoons, and may there be found and killed from time to time. Much can be done in the way of prevention, by killing every morning the moths which may be found on the outside of the hives."—C. V. RILEY (*Missouri Rep. I.*, p. 167).

"Italian bees are rarely injured by moths. The intelligent apiarist will also provide against weak and queenless colonies, which, from their abject discouragement, are the surest victims to moth invasions. Judge J. H. Andrews asserts no bees, Black or Italian, will be troubled so long as the combs are covered with bees. If through carelessness a colony has become thoroughly victimized by these filthy wax devourers, the bees and any combs not attacked should be transferred to another hive; after which the old hive should be fumigated with sulphur, then by giving one or two of each of the remaining combs to strong colonies after killing any pupae that may be on them, they will be cleaned and used; while, by giving the enfeebled colony brood, and, if necessary, a good queen, it will soon recover."—A. J. COOK (*Bee Keepers' Guide*, p. 413).

"Early in September I noticed just outside the entrance to one (the weakest) of my seven colonies of bees, a dead grub, evidently one of the troublesome and injurious Bee-moth grubs. I decided at once to examine the hive, out of which it had probably come, or had been carried by the bees, and, on doing so, soon found abundant evidence of where the intruder had been, which was almost in the centre of one of the brood frames. The bees, however, had proved equal to the emergency and had succeeded in dislodging their natural enemy by cutting away the cells on both sides of the frame (which at this time held brood nearly ready to hatch), and had made an opening in the comb several inches in circumference. I may add that this took place shortly after I had very materially increased the strength of the hive by putting a number of young bees in it from another colony that was particularly strong. I think that perhaps the inference from this would be that so long as colonies of bees are in good condition as regards strength, even if attacked by the bee-moth, they will themselves as a rule get rid of their enemy, which they certainly do not appear to have sufficient energy to do when in a weak state."—PERCY H. SELWYN (in *Ottawa Naturalist*, VIII., 1894, p. 141).

"In the spring, bees carry out dozens of caterpillars apparently lifeless and fly away with them. Those that are frequently thrown down simply on the supporting board, soon recover and creep up again to the combs.

"A swarm that has not many caterpillars, overcomes them and carries them out from time to time, especially in spring. We saw this particularly in an excellent swarm, by which a quantity of caterpillars were removed, and which we helped only by taking away in the morning the numerous caterpillars thrown out by the bees on the supports, so that these might not creep up again to the combs, as often happened."—NÖRDLINGER (quoted by Dr. Ritzema Bos, in *Tierische Schädlinge und Nützlinge*, p. 467).

A subject of much interest to bee-keepers in the greater part of Canada is the possibility of destroying such larvæ and pupæ of the Bee-moth as can be subjected to a very low temperature. Many years ago, in conversation with Mr. J. K. Darling, of Almonte, Ont., an experienced and successful bee-keeper, he informed me that he had had little trouble with the Bee-moth since he adopted the method of storing his empty combs in a dry shed where they would be exposed to the full intensity of winter cold. Having had some discussion with some western bee-keepers last year on this subject, I wrote to Mr. Darling, asking him if he still practised and had the same confidence in freezing to destroy the Bee-moth. The following is part of his answer:—

"Almonte, Ont., Nov. 14, 1894.—Yes, I practise the freezing method every winter. This remedy costs nothing and will suit everybody. It is just the thing for lazy people and those who are too poor to build close warm honey houses. All that is required, is to hang up the combs in the fall and they are all right in the spring. I have done this every year, and I have yet to find the first comb that has been destroyed by the moths

in the spring, although they hang in the hives in an open honey house until swarming time next season. Since the question has been raised as to whether the egg also can be destroyed by freezing, I will give it as my opinion that the frost does destroy the egg also, or else the mother moths in my yard are too wise to lay eggs that will not hatch out in the autumn; certainly none hatch in my combs the next spring. Unless I am careful, I have more or less trouble with them in weak colonies every spring, but the combs affected are always those that have wintered in the cellar or have been hung in the hives in the yard for a time after the bees have been set out. I will guarantee that in the spring I will lose as small a percentage of combs that have been frozen, as any other person will do who fumigates with sulphur and does not freeze. The weak points of the freezing method are: it cannot be applied in warm climates, and, it would spoil comb honey. I have every confidence in the freezing, so much so, that for several years I have not given my stored away combs any thought until I wanted to use them the next season, and I have always found them safe, when the mice had not got at them."

A few weeks later Mr. Darling wrote me further on the same subject:—

"I have been looking up the authorities on the matter of freezing to destroy the bee moth. Prof. Cook says in his *Manual of the Apiary*: 'It is stated by Mr. Quinby that a freezing temperature will kill these insects in all stages, while Mr. Betsinger thinks that a deserted hive is safe; neither of which assertions is correct. I have seen hives whose bees were killed by the severe winter, crowded with moths the succeeding summer. I have subjected both larvæ and pupæ to the freezing temperature without injuring them. I believe, in very mild winters, the moths and the chrysalids might be so protected as to escape unharmed, even outside the hive. It is probable, too, that these insects may pass the winter in any one of the various stages during the cold season, though they generally exist as pupæ.'

"As I have said, the combs should be subjected to a winter's freezing in a dry, cold building. A hive in the yard, with the cover securely fastened to keep out wet, would be all right for empty combs during winter, but would be far more liable to be destroyed by moths the succeeding summer than if the combs were taken out and stored away in some building. You will observe that Prof. Cook does not say what time in the winter the bees died, nor how late the next summer the combs were destroyed. The bees might have died late enough to secure the moth larvæ a safe conduct through the winter, and the comb might have been destroyed late enough to have resulted from eggs deposited after warm weather set in the following spring. I never claimed that merely a 'freezing temperature' would destroy either moth or larvæ,—in fact, I know it will not destroy the larvæ,—and so I agree on that point. Also the statement that in some mild winters they might be so protected as to come through unharmed, is not very far astray, especially if we consider the location to be in some climate like Southern Michigan, or, in fact, any other place where they can raise peaches to perfection.

"That you may see I am in very good company, I will make two or three more references, and while one or two statements may not be exactly correct, I agree with them in the main, and think their teachings would not lead a level-headed bee-keeper very far astray.

"Mr. A. I. Root, in *A B C of Bee Culture*, after describing fumigating with sulphur to destroy the larvæ of the Bee-moth, says: 'Giving your combs a good freezing, say at a temperature of 15 or 20 degrees, will answer the same purpose as the fumigation.' Now, while that temperature might destroy the larvæ if subjected to it for two or three days unprotected, he has not fixed the temperature low enough to be safe. If he had put it 5 degrees or 10 degrees lower, I should say that he would have had a *dead* sure thing of it, as far as the Bee-moth is concerned.

"Again, in *Langstroth on the Honey Bee*, revised by Dadant, p. 464, sec. 810, it says: 'In northern latitudes, where the thermometer ranges for days and weeks below 10 degrees, the Bee-moth worm can winter only in the hive near the bee-cluster. It is a fact worthy of notice that apiaries that are wintered in the cellar are more annoyed with the moth the following summer than those that are wintered out of doors, because none of the larvæ of the moth perish.'

"Dr. Donhoff says that the larvæ became motionless at a temperature of 38 to 40 degrees, and entirely torpid at a lower temperature. A number which he left all the winter in his summer house revived in the spring, and passed through their natural changes. This was in Germany, where the winters are milder than in our Northern and Middle States. Some larvæ which Mr. Langstroth exposed to a temperature of 6 degrees below zero, froze solid and never revived; others, after remaining for eight hours in a temperature of about 12 degrees, seemed after reviving to remain for weeks in a crippled condition.

"G. W. Demaree, of Christiansburg, Kentucky, U. S., says the way he protects his spare combs is to let them freeze through the winter, and in the spring before the moths are around he wraps them in factory cotton, ten to twelve combs in a pack, and they are safe until he wants to use them, whether it is the next season or later. Now, if it is safe in Kentucky, why is it not safe here?"—J. K. DARLING.

The following experiment was carried out by Mr. Fixter at Ottawa:—

"Two hives that had been deserted by their swarms in the autumn were left in the bee yard until the bees were taken into the cellar for the winter; both hives were full of empty combs and had very slight traces of the work of the Bee-moth grub; one of these showed slightly more injury than the other, this one was closed up tightly and was left in a shed for the winter, where it would receive the full benefit of the winter's frosts. It was examined at different times and was kept in the same place until the swarming season the next year, when it was given to a new swarm, and was as good as if there had never been a grub in it. The other hive, which at first showed the least symptoms of injury by the Bee-moth, was taken into a warm office where the temperature would average about 65 degrees during the winter. This hive was also tightly closed at the top and bottom like the former, so that no moth could either get in or out. In the spring, when wanted for use, it was found to contain hundreds of grubs and winged moths. The comb had been entirely destroyed, and was bound together into a solid block by the webs. From this experiment and others, I am certainly convinced that freezing is a good method to keep the Bee-moth at bay."—JOHN FIXTER.

In view of the above, and also of some limited experiments which I carried out at the Experimental Farm, as well as from a careful examination of some samples of infested comb sent to me for examination by Mr. Darling, after they had been subjected to freezing, I feel that I can confidently recommend this easy method of controlling the Bee-moth, for all those districts where the temperature drops to zero Fahrenheit every winter. Mr. Fixter approves most thoroughly of Mr. Darling's plan of freezing to destroy the larvæ of the Bee-moth, and considers that the most convenient way of storing empty combs during the winter is to suspend them from strands of wire stretched across a dry shed, so that they will be safe from mice, but at the same time be exposed to the full intensity of the winter cold.

SOME SPECIALLY NOXIOUS WEEDS.

There has been great anxiety evinced by farmers all over Canada during the past season on the question of noxious weeds. More specimens than ever previously have been sent in for identification and advice as to their treatment. When attending the Central Farmers' Institute of the province of Manitoba, held at Brandon on July 9, 10 and 11 last, I found that the subject of weeds was continually brought forward and was decidedly of more interest than any other. Many specimens were brought to the meeting by delegates, and, at the request of the directors, I delivered two addresses upon noxious weeds. A largely attended and deeply interested meeting was also addressed at Wawanessa, Man., to which I was invited through the kindness of Mr. Hugh McKellar, Deputy Minister of Agriculture for Manitoba. At this latter place also, I was enabled to examine a patch of the so-called RUSSIAN THISTLE (*Salsola Kali*, L., var. *Tragus*, DC. This patch was on the banks of the Northern Pacific Railway. At the time of my visit, June 29, the young plants were very small, only an inch or two high, and great care was being taken to eradicate every plant. Gangs of men were

specially employed all the summer by the railway company to attend to this work of destroying dangerous weeds. Upon inquiring, at the end of the season, how the clean state of the railway which I observed at the end of August had been maintained, Mr. J. E. Riley, the roadmaster, answered as follows through Mr. G. W. Vanderslice :—

“In the matter of destroying noxious weeds during the past season, we have made it a point to go over all the right of way, at least once a week, and cut all that could be found, and, where there was Russian Thistle, oftener. We did not allow any of them to go to seed, and intend to follow this up until they are all exterminated. If the farmers would do the same, we should in a short time have none in the country.”



Fig. 18.—Tumbling Mustard : a young seedling.

Several false reports of the occurrence of the Russian Thistle have been received ; but all of these originated from wrong identifications of the plants referred to. The plant most frequently mistaken for the Russian Thistle is the Tumble weed (*Amarantus albus*), specimens of which were sent in from, among other places, Saskatoon, Sask., a locality in which it has never been found. Another plant in no way resembling the Russian Thistle, but which has been called by the same name, is the Prickly Lettuce (*Lactuca Scariola*), which is becoming too abundant in the county of Essex, Ont., as well as also in the Okanagan valley, B.C., where plants were measured 8 feet in height.

On the journey to Wawanesa with Mr. McKellar, we found that many miles of country between Morris and Myrtle along the railway and in cultivated fields on each side of the railroad, as well as south and west of St. Jean, in the municipality of Reinland, were infested to an alarming extent with the TUMBLING MUSTARD (*Sisymbrium sinapistrum*, Crantz). Immediately on our return to Winnipeg, an illustrated leaflet was issued by the Hon. Thomas Greenway, drawing attention to this pest and also to the HARE'S EAR MUSTARD (*Erysimum orientale*, R. Br.), another intruder which has lately appeared and which threatens likewise to be a cause of enormous loss to western farmers. Attention has already been drawn to these weeds in previous reports ; but from what I have this year seen and heard of them in

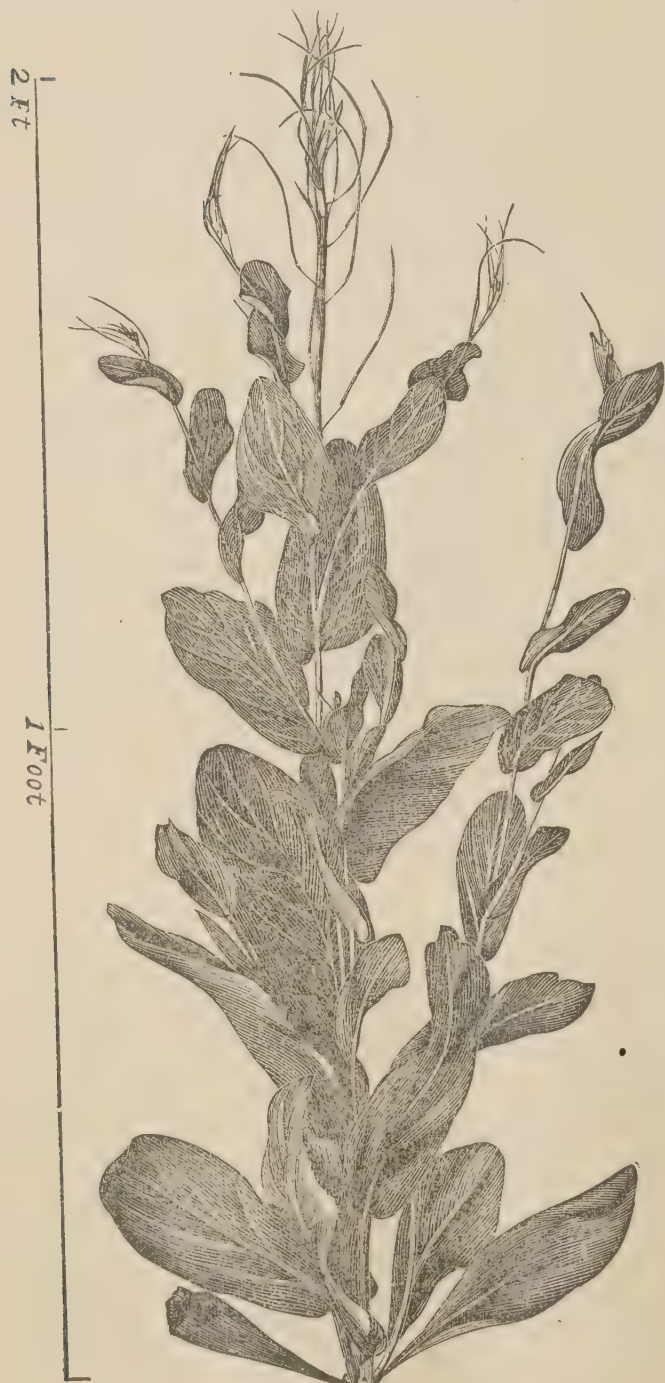


Fig. 19.—Hare's Ear Mustard.

Manitoba and the North-west Territories, I am convinced that it is of the greatest importance that their appearance should be made known to farmers and that great efforts should be put forth at once to control them. I present herewith excellent figures of the Tumbling Mustard (Figs. 18, 20 and 21), and the Hare's Ear Mustard (Fig. 19) from photographs taken by Mr. Robert Mackay at Indian Head on July 5, when most of the plants were coming into bloom. In a later stage of growth the leaves drop off and the whole plant is a mass of long pods, bearing enormous quantities of seeds. Both of these plants are annuals which spring up for the most part in the month of June, and



Fig. 20.—Tumbling Mustard: a large flowering plant.

come into flower about the end of the same month. By the time the wheat among which they grow is ready to harvest, the weed seeds are also ripe and, when the grain is handled, many are shed and left on the fields. These weeds not only have all the bad qualities of other noxious weeds, such as robbing the soil of its fertility—and, what in the west is of paramount importance, drawing off its moisture,—besides crowding and choking the crop, but are also exceedingly difficult to eradicate from the land, like all other members of the Mustard Family.

The importance of calling a plant by its proper name was brought forcibly before my notice in connection with these two weeds during the past summer. Any one who has seen them growing in a crop and noted the rapidity with which they spread, must acknowledge that they are two of the very worst agricultural pests which have ever been introduced into Canada; but, from the fact that Tumbling Mustard was spoken of generally as "Tumble Weed," a name belonging to the much less aggressive *Amarantus albus*, L., small effort was put forth by settlers to destroy it when it first appeared, as it was well known all through the west that the Tumble Weed is not a very troublesome enemy. It was similarly the case with the Hare's Ear Mustard, which I found was generally but wrongly spoken of in some districts as "Black Mustard," a name properly belonging to *Brassica nigra*, Koch, which is a true mustard.

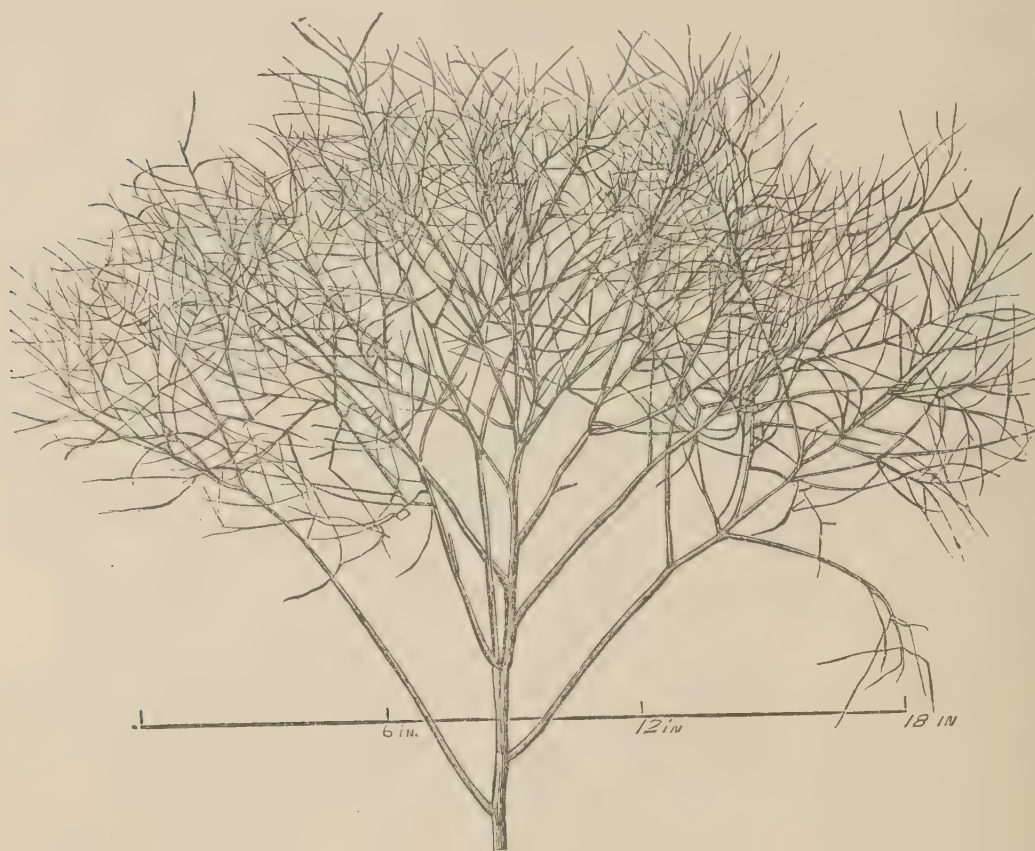


Fig. 21.—Tumbling Mustard: a tumbler with ripe seed.

Two other introduced plants which have spread rapidly and aggressively through Manitoba and the North-West of late years, are the FALSE FLAX (*Camelina sativa*, Fries.) and *Neslia paniculata*, Desv., widely known under the popular and appropriate name of BALL MUSTARD, on account of the shape of its numerous single-seeded, roundish pods. This latter weed is easily detected in a crop by its bright orange flowers. Specimens were found all through Manitoba and the North-West Territories, wherever the small grains are cultivated; and in one locality in Manitoba an area of no less than 200 acres of wheat was noticed to be quite orange with its flowers.



Fig. 22.—Penny Cress.

PENNY CRESS or "Stink Weed" (*Thlaspi arvense*, L.), Fig. 22, is undoubtedly the most abundant weed in Manitoba, the peculiar greenish yellow colour of the unripe pods in infested crops in many parts of the province at once attracting the attention of travellers on the railway. Farmers, however, are becoming very much alive to the importance of fighting this weed, and Mr. Bedford, the Superintendent of the Experimental Farm for Manitoba, receives a great many letters inquiring as to the best treatment to rid land of this pest. He writes me on this subject, as follows:—

"Brandon, Dec. 4, 1895.—We find the most effectual treatment of land infested with Stink Weed is to first of all summerfallow the land thoroughly by ploughing shallow in June, harrowing at once. Then, as soon as the weed seeds have germinated, which is generally in a week, cross-cultivate with disc harrow or cultivator, followed again by the harrow. This will destroy a large number of plants when they are quite young. Should time permit, the land should again be ploughed, but deeper than at first, and well harrowed before hard frosts set in; and the next year, in fact, as long as the Stink Weed plants show, no grain crop should be grown, but the land should be either summer-fallowed or sown to some hoed crop, and every plant of the weed removed before the seeds ripen. A hoed crop, such as field roots, corn, &c., will well repay the extra cost of cleaning the land. We find it impossible to clean the land from this pest as long as a grain crop is grown. The number of seeds from each plant is so

great that the summer-fallowing or hoeing must be thoroughly done or the labour is wasted."—S. A. BEDFORD.

Mr. Bedford's report on the distribution of this weed is that it is to be found in nearly every part of the province, but generally in small patches west of Portage la Prairie.

REPORT OF THE AGRICULTURIST.

(JAS. W. ROBERTSON.)

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to present reports on, (1) experiments in the fattening of cattle, and (2) experiments in the feeding of swine.

Reports on work in the Experimental Dairy and on the 40-acre Lot will be submitted when some unfinished parts are further advanced or are completed.

As in former years, my work as Dairy Commissioner occupied the most of my time.

The supervision of the greatest part of the Agriculturist's branch, viz.: the grain and root crops, was taken by yourself as heretofore.

I am indebted to Mr. John Fixter, farm foreman, and Mr. R. R. Elliott, herdsman, for particularly faithful assistance in the work carried on.

I have the honour to be, sir,
Your obedient servant,

JAS. W. ROBERTSON,
Agriculturist.

PART I.—THE FATTENING OF CATTLE.

Experimental tests in the fattening of steers were commenced at the Central Experimental Farm in December, 1890. The main object of the experiments was to obtain information on the comparative cost of fattening steers:—

(1.) Upon a ration of which the bulky-fodder portion was mainly **corn ensilage, hay and roots**;

(2.) Upon a ration of which the bulky-fodder portion was mainly **hay and roots**; and

(3.) Upon a ration of which the bulky-fodder portion was mainly **corn ensilage**.

For the purpose of arranging such data as would be obtained from the tests, in a manner which would be clear to the farmers and useful to them in making a comparison between the cost of feeding steers on the three different classes of rations, a cash value was estimated for the component fodders in each. The prices at which the several fodders were valued for the purposes of these comparisons, are higher than the cost of production to the ordinary farmers, and may be higher or lower than the prices which could be realized from their sale as fodders.

The values at which the calculations for the different years were made, are as follows :—

TABLE I.

	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Corn ensilage.....Per ton.	1 40	2 00	2 00	2 00	2 00
Robertson mixture ensilage.....				2 50	2 50
Hay.....	8 00	8 00	8 00		8 00
Roots (turnips, mangels and carrots).....	4 00	4 00	4 00		4 00
Straw.....	4 00	4 00	4 00	4 00	
Oil-cake and cotton-seed meal.....	30 00	30 00			
Mixed grain (pease, barley, wheat).....	20 00	20 00	20 00	20 00	20 00
Frosted wheat.....		12 00	12 00		
Mixed grain (equal parts by weight pease, barley, wheat, oil-cake, bran).....					20 00

The following table shows the rations which were fed in 1891-92. In 1890-91 instead of 2 lbs. of oil-cake in each ration, there was 1 lb. each of oil-cake and cotton-seed meal. Otherwise the rations were the same for the two years.

TABLE II.

Ration No. 1.	Lbs.	Ration No. 2.	Lbs.	Ration No. 3.	Lbs.
Corn ensilage.....	20			Corn ensilage.....	50
Hay (cut).....	10	Hay (cut).....	20		
Roots.....	20	Roots.....	40		
Straw (cut).....	5	Straw (cut).....	5	Straw (cut).....	5
Oil-cake.....	2	Oil-cake.....	2	Oil-cake.....	2
Pease (ground).....	2	Pease (ground).....	2	Pease (ground).....	2
Barley (ground).....	2	Barley (ground).....	2	Barley (ground).....	2
	61		71		61

Feeding tests were continued during 1892-93 to obtain further data for a comparison of the economy of using the bulky-fodder portions of rations, No. 2 (hay, roots and straw), and No. 3 (corn ensilage and straw). Instead of equal quantities of meal being added to the different rations, an equal quantity of meal per head per day, was fed to the animals which were classed for comparison in the two groups.

Four steers (two of them 2-year-olds and two of them 1-year-olds) were arranged into Group I. and were fed on ration No. 2, as under ; and four steers of similar age, quality and breeding, were put into Group II. and fed on ration No. 3, as under.

TABLE III.

Ration No. 2.	Lbs.	Ration No. 3.	Lbs.
Hay (cut).....	20	Corn ensilage.. ..	50
Roots (turnips).....	40		
Straw (cut).....	5	Straw (cut).....	5
	65		55

The animals were allowed as much of the mixture as they would eat. The meal, which was fed in addition, was a mixture of equal parts by weight of ground barley, pease and frosted wheat. The two-year-old steers in both groups were given 5 lbs. per head per day of the meal; and the one-year-old steers in both groups were given 4 lbs. per head per day of the meal. Occasionally, when the animals "were off their feed," the meal was reduced for a few days.

The full particulars of the feeding and the weights are given in the report of Experimental Farms, 1893.

The following is a summary of the results from the feeding tests for three years with two-year-old steers.

Conclusions. From the tests in 1890-91 it appears that:—

(1.) During the feeding period of 20 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight, on the average, 33 lbs. per head MORE, and COST 7.33 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal);

(2.) During the feeding period of 20 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight, on the average, 61½ lbs. per head MORE, and COST 3.68 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 1 (hay, roots, corn ensilage, straw and meal);

(3.) When the experiment was ended, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal) were in the most attractive condition of the three lots for handling and selling.

Conclusions. From the tests in 1891-92 it appears that:—

(1.) During the feeding period of 18 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight on the average 55½ lbs. per head MORE, and COST 3.75 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal);

(2.) During the feeding period of 18 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight on the average 36 lbs. per head MORE, and COST 3.81 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 1 (hay, roots, corn ensilage, straw and meal);

(3.) The cost for feed consumed per 100 lbs. of increase in live weight, was 62.95 per cent greater on ration No. 2 (hay, roots, straw and meal), and 48.32 per cent greater on ration No. 1 (hay, roots, corn ensilage, straw and meal) than it was on ration No. 3 (corn ensilage, straw and meal).

Conclusions. From the tests in 1892-93 it appears that:—

(1.) During the feeding period of 24 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal) GAINED in weight on the average 19 lbs. per head MORE, and COST 5.06 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal);

(2.) The cost for feed consumed per 100 lbs. of increase in live weight, was 66.34 per cent greater on ration No. 2 (hay, roots, straw and meal) than it was on ration No. 3 (corn ensilage, straw and meal).

Conclusions. From these tests for three years with two-year-old steers, it appears that:—

(1.) On the average the steers which were fed on ration No. 3 (corn ensilage, straw and meal) GAINED in weight on the average 35.8 lbs. per head MORE, and COST 5.38 cents LESS per head per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal).

(2.) On the average of two years, the cost for feed consumed per 100 lbs. of increase in live weight, was 64.64 per cent greater on ration No. 2 (hay, roots, straw and meal) than it was on ration No. 3 (corn ensilage, straw and meal).

The following tables show the average of the results from six animals (2 two-year-old steers, 2 one-year-old steers and 2 two-year-old heifers) fed upon ration No. 2

(hay, roots, straw and meal) and from seven animals (3 two-year-old steers, 2 one-year-old steers and 2 two-year-old heifers) fed upon ration No. 3 (corn ensilage straw and meal) for the whole feeding period of 24 weeks :—

TABLE IV.

Ration.	—	Weight, Nov. 22.	Weight. May 9.	Increase in weight.	Increase per head per day.
		Lbs.	Lbs.	Lbs.	Lbs.
Hay, roots and straw....	Average of six ani- mals.....	1,024	1,201	177	1·05
Corn ensilage and straw.	Average of seven animals.....	997	1,225	228	1·35

TABLE V.

Ration.	—	Bulky-fodder per head per day	Meal per head per day.	Cost per head per day.	Cost per 100 lbs. of increase
		Lbs.	Lbs.	cents.	\$
Hay, roots and straw....	Average of six ani- mals..	44.00	4·41	13·87	13.35
Corn ensilage and straw.	Average of seven animals	50.31	4·36	9·26	6.95

Conclusions. From these tests it appears that :—

(1.) During the feeding period of 24 weeks, the animals which were fed upon ration No. 3 (corn ensilage, straw and meal) GAINED in weight on the average 51 lbs. per head MORE, and cost 4·61 cents per head LESS per day for feed consumed, than the animals which were fed upon ration No. 2 (hay, roots, straw and meal).

(2.) The cost for feed consumed per 100 lbs. of increase in live weight, was 92·08 per cent greater on ration No. 2 (hay, roots, straw and meal), than it was on ration No. 3 (corn ensilage, straw and meal);

(3.) The cost of feed consumed per 100 lbs. of increase in weight was lowest in the case of a grade Shorthorn heifer (viz., \$5.44 per 100 lbs. of increase in weight), fed upon ration No. 3 (corn ensilage, straw and meal).

Feeding tests were begun in 1893-94 to gain information on the comparative cost of fattening steers :—

(1.) Upon a ration of which the bulky-fodder portion was Indian corn ensilage and straw ; and

(2.) Upon a ration of which the bulky-fodder portion was Robertson mixture ensilage and straw.

The Robertson mixture for ensilage was reported upon in the report of Experimental Farms 1893. It is composed of the whole plants of Indian corn (*Zea mays*), horse beans (*Faba vulgaris*) and the heads of sunflowers (*Helianthus annuus*). Briefly it “came about” from the fact that for some years I had been looking for some other plant or plants to put into the silo with Indian corn to furnish the quantity of albuminoids necessary to make a balanced ration, in a form which would cost less than ripened cereals or concentrated feeding stuffs, such as oil-meal, cotton-seed meal or bran.

Clovers and pease were tried with indifferent success, and the climbing or pole beans were grown with cornstalks for trellis without appreciable advantage. It is desirable that ensilage should contain, besides the albuminoids and carbo-hydrates such

as may be found in Indian corn and horse beans, a larger quantity of fat than these plants contain. In a country with such a climate as prevails in Canada during the winter, it seems advisable to provide a winter ration for cattle containing a fairly large proportion of fat, as a bland, heat-producing part of a ration in a cheap and palatable form. I venture to believe that we have now secured that in the heads of sunflowers.

The horse bean or small field bean (*Faba vulgaris*, variety *equina*) seems to meet the case, so far as the albuminoids are concerned. This plant grows with a stiff, erect stem of a quadrangular shape. It attains in Canada a height of from 3 to 6 feet. It bears pods, from within 6 or 8 inches from the base of the stalk to near its top. The beans when ripened are of a grayish-brown colour, and of oblong round shape, about $\frac{1}{2}$ -inch in long diameter and from $\frac{3}{8}$ to a $\frac{1}{4}$ -inch in short diameter. Plants have carried ripened beans in the lower pods, while the topmost ones on the same stalks were only beginning to form.

The sunflower (*Helianthus annuus*) grows luxuriantly over the whole of the temperate zone on this continent, and the seeds contain a large percentage of fat. The variety known as *Mammoth Russian* has been grown in rows 3 feet apart, and it appears to do best when the plants are 18 inches apart in the rows.

The "mixture" should contain about 10 tons of Indian corn fodder to $2\frac{1}{2}$ tons of horse beans and one ton of sunflower heads. To obtain it in these proportions it should be grown at the rate of one-quarter of an acre of sunflowers, and half an acre of horse beans to every acre of Indian corn. It is to be fed with 4 lbs. less meal or grain per 50 lbs. of ensilage than has been required with ordinary Indian corn ensilage, to make it an economical ration for feeding milking cows and fattening cattle.

For the feeding tests of 1893-94 **six steers** were purchased. They were rough cattle with little good breeding and they did not appear to thrive well. Two animals, one steer "Finlay" and one heifer "Polly," reared on the Experimental Farm, were fed on the same rations. They did fairly well and showed a low cost per 100 lbs. of increase in weight.

The **eight animals** were put in two groups and fed from January 3rd to January 17th on a ration composed as follows:—

	Lbs.
Indian corn ensilage.....	50
Roots (turnips and mangels).....	30
Hay.....	15
No meal or grain.	

From January 17th to May 23rd, a period of eighteen weeks, they were fed on the following rations:—

Group I.—4 animals on Ration No. 3.	Lbs.	Group II.—4 animals on Ration No. 4.	Lbs.
Indian corn ensilage.....	50	Robertson mixture ensilage.....	50
Straw.....	5	Straw.....	5
Mixed grain (equal parts by weight of pease, barley and wheat, all ground.)		Mixed grain (equal parts by weight of pease, barley and wheat, all ground.)	

The animals were allowed as much of the bulky fodder part of the rations as they would eat. The mixed grain was weighed out to each animal separately. The animals in group I. were allowed 5 lbs. per head per day, and from April 11 that was increased to 7 lbs. per head per day. The animals in group II. were allowed 1 lb. per head per day, and from April 11. that was increased to 3 lbs. per head per day. The Indian corn ensilage, fed during January and February, was of poor quality, being made from Thoroughbred White Flint and Mastodon Dent corns, which had not grown to near maturity.

As in former years, the comparison between the cost of feeding steers on the different rations was based upon the cash value which was estimated for the component fodders in them as in table I.

The following tables show, (1) the quantity of fodder consumed per head per day, (2) the quantity of meal consumed per head per day, (3) the increase in weight per head for the period of 18 weeks, (4) the increase in weight per head per day, (5) the cost of feed per head per day, and (6) the cost per 100 lbs. of increase in weight for feed consumed.

TABLE VI.

GROUP I.—On Indian corn ensilage and straw.

Name.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	\$ cts.
Finlay.....	40·66	5·44	204	1·61	9·87	6·13
Dick.....	47·62	5·44	167	1·32	10·63	8·05
Jack.....	51·35	5·44	142	1·12	11·00	9·82
Billy	60·65	5·44	146	1·15	12·05	10·47
Average.....	50 07	5·44	164·75	1·30	10·88	8·32

TABLE VII.

GROUP II.—On Robertson mixture ensilage and straw.

Name.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.]	Lbs.	Lbs.	Lbs.	Cents.	\$ cts.
Joe	62·87	1·66	81	0·64	9·94	15 53
George.....	59·88	1·66	95	0·75	9·55	12 73
Pat	49·34	1·66	93	0·73	8·16	11 17
Polly.....	38·34	1 66	111	0·88	6·71	7 62
Average.....	50·60	1·66	95	0·75	8·59	11·39

Conclusions.—(1.) In this test the animals on the Robertson mixture ensilage with the small allowance of grain per day during the first twelve weeks of the feeding period did not show a satisfactory gain ;

(2.) During the last six weeks of the feeding period (with the increase of 2 lbs. of meal per head per day) the animals of group I. gained 34 per cent of the total increase in weight of the whole feeding period of eighteen weeks ; and the animals of group II. gained 52 per cent of the total increase in weight of the whole feeding period of eighteen weeks.

In 1894-95 feeding tests were continued for a comparison of the cost of fattening steers on a bulky-fodder ration composed of,—

(1) Indian corn ensilage, roots and hay.

(2) Robertson mixture ensilage, roots and hay.

Eight steers were divided into two groups as nearly even as possible.

From December 19 to April 10, a period of 16 weeks, they were fed on the following rations:—

Group I.—4 animals on ration No. 1.	Lbs.	Group II.—4 animals on ration No. 4.	Lbs.
Indian corn ensilage.....	50	Robertson mixture ensilage	50
Roots (turnips).....	25	Roots (turnips).....	25
Hay	5	Hay	5
Mixed meal (equal parts by weight of pease, barley, wheat, all ground, oil-cake and wheat bran).		Mixed meal (equal parts by weight of pease, barley, wheat, all ground, oil-cake and wheat bran).	

The animals were allowed as much of the bulky-fodder part of the rations as they would eat. The mixed grain was weighed out to each animal separately. The animals in group I. were allowed 6 lbs. per head per day, and the animals in group II. were allowed 2 lbs. per head per day.

The following tables show, (1) the quantity of fodder consumed per head per day, (2) the quantity of meal consumed per head per day, (3) the increase in weight per head for the period of 16 weeks, (4) the increase in weight per head per day, (5) the cost of feed per head per day, and (6) the cost per 100 lbs. of increase in weight for feed consumed.

TABLE VIII.

GROUP I.—On Indian corn ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	\$ cts.
No. 1.....	50·06	6	210	1·87	13·50	7 20
No. 2.....	49·99	6	165	1·47	13·49	9 15
No. 3.....	55·13	6	170	1·51	14·26	9 39
No. 4.....	55·46	6	170	1·51	14·31	9 42
Average.....	52·66	6	178·75	1·59	13·89	8 70

TABLE IX.

GROUP II.—On Robertson mixture ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	\$ cts.
No. 5.....	63·11	2	165	1·47	12·45	8 45
No. 6.....	64·74	2	200	1·78	12·72	7 12
No. 7.....	63·75	2	215	1·91	12·55	6 53
No. 8.....	52·50	2	123	1·09	10·69	9 73
Average.....	61·02	2	175·75	1·56	12·10	7 71

After April 10 a change was made, and the steers of group I. were put on ration No. 4, on which the steers of group II. had been fed ; and the steers of group II. were put on the ration No. 1, on which the steers of group I. had been fed.

One steer of group I. became sick, and the corresponding steer in group II. was also dropped out of the test. The test after the change of rations was made, was continued from April 11 to June 5, a period of 8 weeks. During the last week of the test, the supply of corn ensilage became exhausted, and the steers of group II. were fed on ration No. 4 for that week. The allowance of meal during that week was reduced to 2 lbs. per head per day. That accounts for the average quantity of meal per head per day for the period of 8 weeks being 5.5 lbs. instead of 6 lbs. which was the quantity fed per head per day for seven weeks. It is not considered that the one week of different feeding made any appreciable difference in the results.

The following tables show, (1) the quantity of fodder consumed per head per day, (2) the quantity of meal consumed per head per day, (3) the increase in weight per head for the period of 8 weeks, (4) the increase in weight per head per day, (5) the cost of feed per head per day, and (6) the cost per 100 lbs. of increase in weight for feed consumed.

TABLE X.

GROUP I.—On Robertson mixture ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	\$ cts.
No. 1.....	59.14	2	78	1.39	11.79	8.46
No. 2.....	56.26	2	94	1.67	11.31	6.73
No. 3.....	58.08	2	76	1.35	11.61	8.55
Average.....	57.82	2	82	1.47	11.57	7.83

TABLE XI.

GROUP II.—On Indian corn ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	\$ cts.
No. 5.....	62.02	5.5	64	1.14	14.80	12.93
No. 6.....	61.00	5.5	54	0.96	14.65	15.19
No. 7.....	53.39	5.5	43	0.76	13.50	17.60
Average.....	58.80	5.5	53	0.95	14.31	14.93

The following table shows for the whole period of 24 weeks, December 19 to June 5, the cost per 100 lbs. of increase in weight while the animals were being fed on the different rations :—

TABLE XII.

Rations.	Total increase in weight.	Cost per 100 lbs. of increase.
	Lbs.	\$ cts.
Indian corn ensilage, roots and hay, Groups I. and II.....	876	9·85
Robertson mixture ensilage, roots and hay, Groups II. and I.....	951	7·75

Conclusion.—From this test it appears that :—The cost for feed consumed per 100 lbs. of increase in live weight was 27·1 per cent greater on ration No. 1 (Indian corn ensilage, roots, hay and meal) than it was on ration No. 4 (Robertson mixture ensilage, roots, hay and meal).

PART II.—THE FEEDING OF SWINE.

Experiments were continued during 1894 to gain further information of the results from feeding swine on rations composed of different food materials. An examination was made (1) of the different rations consumed per pound of increase in live weight, and (2) of the percentage of shrinkage in weight after the animals were killed and dressed. In 1894 experiments were begun to discover the effect on the quality of the flesh of swine from the feeding of wheat and buckwheat. Complaints had been made by buyers of swine in Western Ontario that the quality of the meat was soft in a larger percentage of the animals killed than formerly ; and an opinion was current that the “softness” was a consequence of the feeding of wheat or of buckwheat. Fourteen swine of three different litters were sorted into three lots as nearly even as possible. They were fed as follows :—

Lot 1.—Fed on **a mixture** of equal parts by measure of barley, rye, wheat (all ground) and wheat bran, soaked in cold water for an average period of 30 hours.

Feed consumed per pound of increase in live weight,—4·28 lbs.

Lot 2.—Fed on **ground wheat**, soaked in cold water for an average period of 30 hours.

Feed consumed per pound of increase in live weight,—4·10 lbs.

Lot 3.—Fed on **ground buckwheat**, soaked in cold water for an average period of 30 hours.

Feed consumed per pound of increase in live weight,—4·45 lbs.

On October 11 these 14 swine were shipped alive to the Ingersoll Packing Company, Ingersoll, Ont., to be slaughtered and cured in the manner followed by packers who send bacon and hams to the British market. The swine of each lot were marked differently, and a report was made upon them by the manager of the Ingersoll Packing Company, according to the descriptive marks.

The report on the condition of the swine, 10 hours after they were killed, was as follows :—

“Lot 1, fed on mixed grain ; leaf lard, fairly firm ; best of the three lots.

Lot 2, fed on ground wheat ; lard softish ; not so firm as hogs of lot 1.

Lot 3, fed on ground buckwheat ; lard soft, and hogs also soft.”

The report on the sides of bacon after they were cured was as follows :—

“Lot 1, fed on mixed grain; four hogs; all the sides turned out good hard meat, they were the best of the three lots.

Lot 2, fed on ground wheat; five hogs; six sides were soft and four quite firm.

Lot 3, fed on ground buckwheat, five hogs; two sides were soft and eight sides were firm.”

Eight swine of a litter of cross-breds of Tamworth sire and Poland-China dam (farrowed May 26) were put into three lots as nearly even as possible.

TABLE I.

Pen No. 1 contained 3 swine.

They were fed on a mixture composed of equal parts by measure of barley, rye, wheat (all ground), and wheat bran, soaked in cold water for an average period of 30 hours.

Pen No. 1.	Aug. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	117	177	238	317	384	438	.....
Increase in weight.....		60	61	79	67	54	321
Feed consumed.....		198	210	239·5	233	224	1104·5
do per lb. of increase in live weight.....		3·30	3·44	3·03	3·47	4·14	3·44

TABLE II.

Pen No. 3 contained 3 swine.

They were fed on a ration composed of equal parts by weight of a mixture as fed to pen No. 1, and ground wheat, soaked in cold water for an average period of 30 hours.

Pen No. 3.	Aug. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	117	181	228	302	370	420	.....
Increase in weight.....		64	47	74	68	50	303
Feed consumed.....		208	178	217	242	212	1057
do per lb. of increase in live weight.....		3·25	3·78	2·93	3·55	4·24	3·48

TABLE III.

Pen No. 5 contained 2 swine.

They were fed on a ration composed of equal parts by weight of a mixture as fed to pen No. 1, and ground buckwheat, soaked in cold water for an average period of 30 hours.

Pen No. 5,	Aug. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	96	166	247	337	395	445	.....
Increase in weight.....		70	81	90	58	50	349
Feed consumed.....		203	264	316	284	256	1323
do per lb. of increase in live weight.....		2·90	3·25	3·51	4·89	5·12	3·79

TABLE IV.

Table IV. shows the percentages of shrinkage in weight in the three lots.

	Pen No. 1. Fed on mix- ture.	Pen No. 3. Fed on mix- ture and ground wheat.	Pen No. 5. Fed on mix- ture and ground buck- wheat.
	3 Swine.	3 Swine.	2 Swine.
	Lbs.	Lbs.	Lbs.
Live weight, after feeding	443	442	454
do off feed and water 24 hours.....	429	424	440
Percentage of shrinkage	3.16	4.07	3.08
Dressed weight, 24 hours after killing.....	336	334	362
Percentage of shrinkage from fasted weight.....	21.67	21.22	17.72

Eight swine of a litter of cross-breds of **Essex** sire and **Yorkshire** dam (far-
rowed June 4) were put into **two** lots as nearly even as possible.

TABLE V.

Pen No. 7 contained 4 swine.

They were fed on a ration composed of **equal parts** by weight of a **mixture**,
as fed to pen No. 1 (equal parts by measure of barley, rye, wheat, all ground, and wheat
bran), and **ground wheat**, soaked in cold water for an average period of 30 hours.

Pen No. 7.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Jan. 23.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	223	300	383	465	528	569	.....
Increase in weight.....		77	83	82	63	41	346
Feed consumed.....		350	285	288	255	228	1,406
do per lb. of increase in live weight.....		4.54	3.43	3.51	4.04	5.56	4.06

TABLE VI.

Pen No. 8 contained 4 swine.

They were fed on a ration composed of **equal parts** by weight of a **mixture**,
as fed to pen No. 1 (equal parts by measure of barley, rye, wheat, all ground, and wheat
bran), and **ground buckwheat**, soaked in cold water for an average period of 30
hours.

Pen No. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Jan. 23.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	220	323	459	551	635	671	.....
Increase in weight.....		103	136	92	84	36	451
Feed consumed.....		404	442	411	383	275	1,915
do per lb. of increase in live weight.....		3.92	3.25	4.46	4.55	7.63	4.24

TABLE VII.

Table VII. shows the percentages of shrinkage in weight in the two lots.

	Pen No. 7. Fed on mix- ture and ground wheat.	Pen No. 8. Fed on mix- ture and ground buck- wheat.
	4 Swine.	4 Swine.
	Lbs.	Lbs.
Live weight, after feeding.	562	676
do off feed and water 24 hours.....	551	660
Percentage of shrinkage.....	1.95	2.36
Dressed weight, 24 hours after killing.....	443	540
Percentage of shrinkage from fasted weight.....	19.60	18.18

Conclusions.—(1.) From the tests in 1894 referred to at page 191, it is evident that the feeding of wheat alone and of buckwheat alone is **not always a cause** of “soft” hogs and “soft” sides, since some of the swine fed on wheat and buckwheat yielded sides classed as firm ;

(2.)—The report of the buyer and curer on the swine reported on in Tables I, II, III, V and VI was that he could not detect any difference in the quality of the meat ; from which it is evident that the feeding of rations composed to the extent of one-half of ground wheat and to the extent of one-half of ground buckwheat is **not a cause** of “soft” sides ;

(3.) The percentage of shrinkage, from fasted weight to dressed weight 24 hours after killing, was 2.46 per cent less in the swine fed on the mixture and ground buckwheat, than in the swine fed on the mixture and ground wheat.

Seven swine of a litter of crossbreds of Yorkshire sire and Tamworth, dam (farrowed July 5) and a litter of grades of Tamworth sire and Berkshire grade dam (farrowed July 15) were put into two lots as nearly even as possible.

TABLE VIII.

Pen No. 9 contained 3 swine :—1 Yorkshire sire and Tamworth dam, and 2 Tamworth sire and Berkshire grade dam.

They were fed on a mixture composed of equal parts by measure of barley, rye wheat (all ground) and wheat bran, soaked in cold water for an average period of 30 hours.

Pen No. 9.	Dec. 19.	Jan. 16.	Feb. 13.	Mar. 13.	Apl. 10.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	350	440	540	623	691	.....
Increase in weight		90	100	83	68	341
Feed consumed.....		375	413	379	283	1,450
do per lb. of increase in live weight.....		4.16	4.13	4.56	4.16	4.25

TABLE IX.

Pen No. 10 contained 4 swine :—1 Yorkshire sire and Tamworth dam, and 3 Tamworth sire and Berkshire grade dam.

They were fed on a mixture as fed to pen No. 9, getting half as much in quantity as pen No. 9 plus as much skim-milk as they would consume.

Pen No. 10.	Dec. 19.	Jan. 16.	Feb. 13.	March 13.	April 10.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	412	548	708	862	985	.....
Increase in weight.....		136	160	154	123	573
Feed consumed.....		187.5	206.5	189.5	141.5	725
do per lb. of increase in live weight.		2,915	3,814	3,814	3,983	14,526
		1.37	1.29	1.23	1.15	1.26
		21.43	23.83	24.76	32.38	25.35

TABLE X.

Table X shows the percentages of shrinkage in weight in the two lots.

	Pen No. 9. — Fed on mixture. — 3 swine.	Pen No. 10. — Fed on mixture plus skim milk. — 4 swine.
	Lbs.	Lbs.
Live weight, after feeding.....	717	1,034
do off feed and water 24 hours.....	702	986
Percentage of shrinkage.....	2.09	4.64
Dressed weight, 24 hours after killing.....	562	808
Percentage of shrinkage from fasted weight.....	19.94	18.05

TABLE XI.

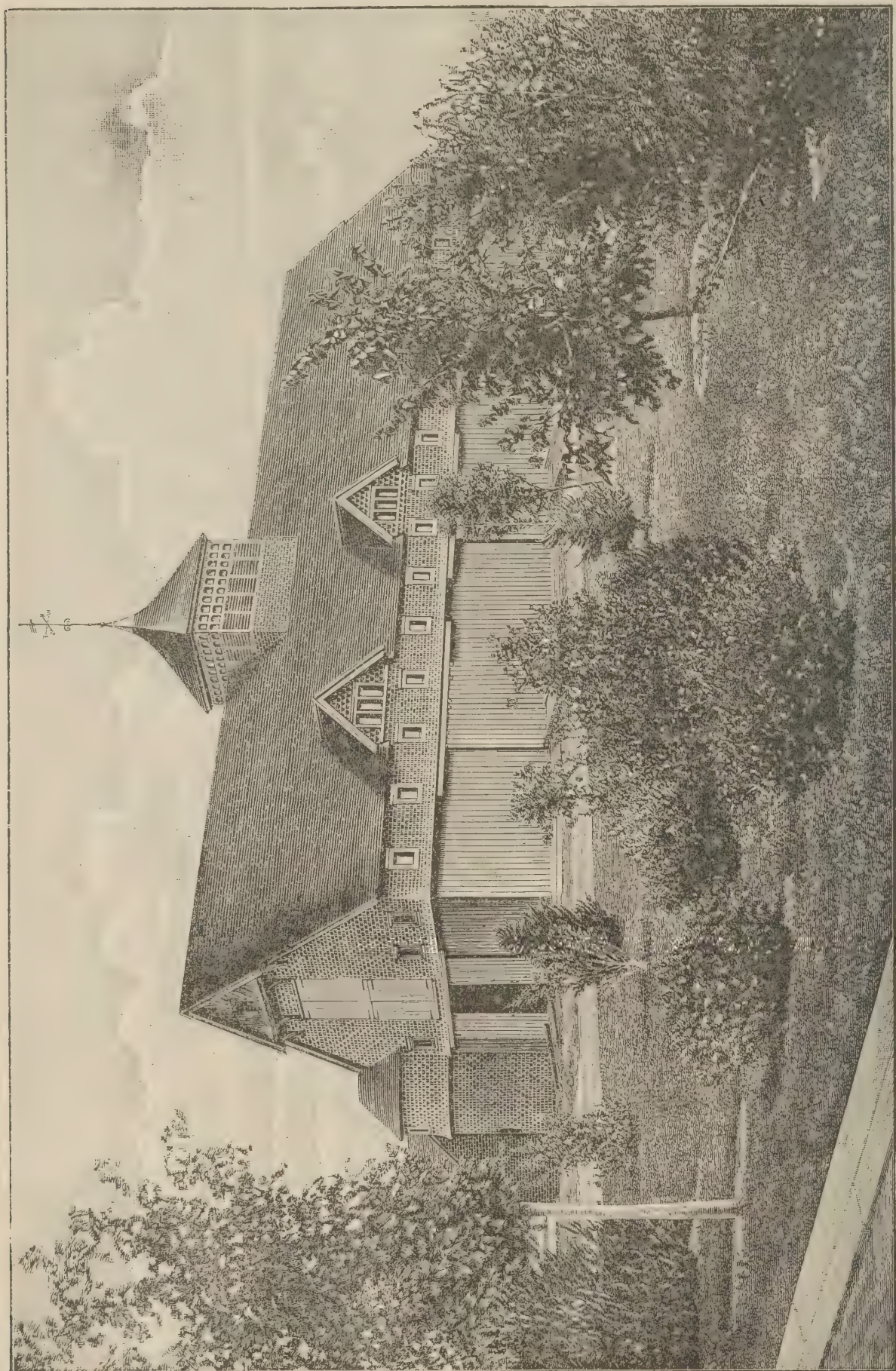
Five cross-bred swine.—Berkshire sire and Yorkshire dam (farrowed March 15) were fed on wheat shorts, soaked in cold water for an average period of 30 hours plus 30 lbs. of skim-milk per day to the pen.

Pen. No. 1.—5 Swine.	Sept. 18.	Oct. 16.	Nov. 13.	Total.
	Lbs.	Lbs.	Lbs.	Lbs.
Live weight.....	896	1,111	1,305	.....
Increase in weight.....		215	194	409
Feed consumed.....		725	823	1,548
do per lb. of increase in live weight.		840	840	1,680
		3.37	4.24	3.80
		3.90	4.32	4.10

Conclusions.—From these tests, from the tests in 1894, and from our experience in feeding young pigs, it appears that :—

- (1.) Skim-milk may form the largest part of the feed of young and growing pigs with advantage and economy ;
- (2.) For the fattening of swine weighing on the average over 100 lbs. each, live weight, it is economical to give an allowance of skim-milk not exceeding 5 lbs. per head per day ;
- (3.) In every case the swine fed with part of their ration of skim-milk were lustier, more vigorous and of a more healthy appearance than swine fed wholly on a ration for gain.

The accompanying cut represents the barn at the Central Experimental Farm, Ottawa.



BARN AT CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE CHEMIST.

(FRANK T. SHUTT, M.A., F.I.C. F.C.S.)

OTTAWA, 1st December, 1895.

WM. SAUNDERS, Esq.
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the ninth annual report of the Chemical Department of the Dominion Experimental Farms.

The chemical examination of Canadian virgin soils has been continued, this branch of the work being confined during the past year to samples from the province of British Columbia. In addition to the estimation of the *total* amount of plant food, a determination of the proportion of potash and phosphoric acid *more immediately available* in certain of the soils has been made according to the methods of Dr. Bernard Dyer, an eminent English agricultural chemist, who has recently made extensive researches on the subject of the availability of plant food in the soil. A diagnosis of the soils analysed is furnished, together with suggestions for their economic improvement.

Many samples of soils have been received from farmers. These, for obvious reasons, have not been subjected to a complete chemical analysis. A preliminary qualitative examination of them has, however, in all cases been made and reports have been furnished as to their character and the methods and measures for their improvement.

Naturally-occurring fertilizers include swamp muck, river and tidal muds, marls and other natural deposits containing plant food. The present report gives the analytical data obtained from the examination of many samples of these substances sent from various parts of Canada.

The ascertaining of the composition of food stuffs, dairy products, insecticides, special fertilizers and many other materials relating to agriculture, has formed a part of the work of this division.

A continuance of the experiments with various brands of "foundation comb" has been made and a report thereon will be found incorporated with that of the Entomologist and Botanist.

Further work here reported on includes "The Chemistry of Lead Arsenate, a New Insecticide"; the determination of the fertilizing value of tankage, slaughterhouse refuse, and waste from a shoddy factory; and the examination of moss litter and bracken fern as absorbents.

Instructive chapters on Basic Phosphate of Lime and Potash, on Ground Mineral Phosphate as a Fertilizer, on an Extensive Series of Experiments towards rendering available the Phosphoric Acid in Mineral Phosphate; and Superphosphate as a Fertilizer, are given.

The subject of "Green Manures" is discussed in all its bearings, and the results of the analyses of the clover plant, given in tabular form.

Well waters from farm homesteads have, as heretofore, received attention and those examined during the past year are here duly reported on.

An account of the most important details of the examination of the Canadian cereals at the World's Columbian Exposition is presented. The data here furnished afford ample

proof of the high food value of grains grown in Canada, and more especially emphasize the nutritive and milling qualities of the wheat of Manitoba and the North-west Territories. The results also show several points in favour of Canadian oats when compared with the foreign samples.

Besides the attention given to special experiments and investigations requiring the aid of chemistry, inaugurated by us, a large amount of work has been done on samples sent in by farmers. These may be tabulated as follows :—

SAMPLES received from farmers for examination and report.

November 30th, 1894, to November 30th, 1895.

	British Columbia	N.W. Territories	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	P.E. Island.	Total.
Soils.....	26	1	1	14	5	.....	2	.....	49
Swamp mucks.....	.....	.....	.....	13	4	.....	7	.....	24
Marsh and river muds.....	6	.....	.....	2	3	.....	14	.....	25
Fertilizers.....	3	.....	1	18	5	5	6	1	39
Waters.....	10	.....	7	53	10	6	.....	.....	86
Miscellaneous.....	3	7	4	25	10	3	9	.....	61
Total.....	48	8	13	125	37	14	38	1	284

A perusal of the above will make it clear that the farmers throughout the Dominion recognize the value of chemical assistance in their avocation and are availing themselves of the help offered them through the Experimental Farm system.

As a further proof of this fact, it may be stated that from November 30th, 1894, to the same date in 1895, 1323 letters have been despatched and 1223 received from farmers. The letters received contain inquiries on agricultural matters, and the answering of correspondents has now become an important part of my work.

The chief conventions addressed during the past year were as follows :—

The Farmers' and Dairymen's Association of New Brunswick, at Fredericton, N.B.

The Dairymen's Association of Eastern Ontario, at Gananoque, Ont.

The Creameries' Association of Ontario, at Chesley, Ont.

The Fruit Growers' Association of Nova Scotia, at Annapolis, N.S.

The Farmers' and Dairymen's Association at Bridgetown, N.S.

The Central Canada Agricultural Association, at Montreal, Que.

The District of Huntingdon Dairymen's Association, at Huntingdon, Que.

My thanks are due to Mr. Henry S. Marsh, Associate of the Institute of Chemistry, the Assistant Chemist, who has done valuable work in the laboratory during the past year and who has constantly endeavoured by his intelligent and assiduous application to make efficient the work of this department.

I have the honour to be, sir,
Your obedient servant,

FRANK T. SHUTT,
Chemist, Dom. Exp'l Farms.

Chemical Laboratories,
Central Experimental Farm,
Ottawa.

VIRGIN SOILS OF CANADA.

BRITISH COLUMBIA.

The soils submitted to complete analysis during the past year and now reported on are all from the province of British Columbia. They were obtained from the Island of Vancouver and the mainland, and were especially selected as being representative of large areas of land.

In the reports of former years I have discussed at some length the factors that conduce to a soil's fertility; it will, therefore, be only necessary on the present occasion to present the following digest:—

Tilth or Mechanical Condition.—This is a factor of great importance to a soil's productiveness. A good tilth includes the following qualities: retentivity of moisture, of warmth and of soluble fertilizing material, permeability to air and water, freedom for root extension, stability and strength, with friability.

These properties are largely dependent upon the relative amounts of a soil's ingredients—clay, sand, humus, &c. Dr. Fream, in his work entitled "*Soils and their Constituents*," says (page 101) that "experience proves that a soil is best adapted for the purposes of cultivation when it contains of:

Sand (siliceous and calcareous).....	50-70 per cent
Clay	20-30 "
Pulverized limestone	5-10 "
Humus (semi-decayed vegetable matter).	5-10 "

"It thus contains enough sand to make it warm and pervious to air and moisture; enough clay to render it moist, tenacious and conservative of manures; enough limestone to furnish calcareous material and to decompose organic matter, and lastly, sufficient humus to assist in supplying the alimentary needs of the plant and to aid in maintaining the carbonic acid in the interstitial air of the soil."

Finally, the culture that a soil receives has necessarily much to do with its tilth. Underdraining, ploughing, harrowing, rolling and other mechanical operations are the means that the skilful farmer uses in bringing about a favourable and fertile seed bed. These operations must be considered as equally essential with the manuring of the land, for they not only conduce to improved tilth but indirectly add to the soil's store of available plant food.

Chemical Composition of Soils.—Plants require for their sustenance and growth certain constituents contained in and obtained from (1) the atmosphere, and (2) the soil; we may at the present juncture briefly consider the latter.

Inorganic Constituents.—These comprise principally lime, magnesia, oxide of iron, alumina, potash and soda, combined with silica, phosphoric, sulphuric, hydrochloric and carbonic acids. They are present in a soil by reason of the disintegrating action of atmospheric and other agencies upon the rocks, which at one time entirely covered the earth's surface, the material so formed being now the inorganic and mineral portion of the soil.

Of the above named elements, potash and phosphoric acid must be regarded by the farmer as the most important, since, although the others are equally essential to the life of the plant, it is the available store of these two that continuous crop growth more particularly depletes, and, therefore, that the agriculturist must seek to restore in order to maintain and increase the soil's fertility.

Potash is present in the soil as a result of the decomposition of the originating granite or other felspathic rock. It exists there chiefly in an insoluble condition. Digestion of a soil with hot, strong hydrochloric acid, by the method agreed upon by the Association of the Official Agricultural Chemists of the

ANALYSES of Soils (air-dried), 1895.

Number.	Soil.	Locality.	Water.	Organic and Volatile matter.	Clay and Sand.	Oxide of Iron and Alumina.	Lime.	Magnesia.	Potash.	Soda.	Phosphoric Acid	Soluble Silica.	Carbonic Acid. (undetermined.)	Total.	Nitrogen.	Clay and Fine Sand.	Coarse Sand.
1	Surface.....	Alberni, B.C.....	3·82	10·89	58·84	23·17	0·97	0·86	0·16	0·02	0·33	0·10	0·84	100·00	0·157	33·34	25·50
2	"	Okanagan Mission, B.C.....	1·89	3·89	81·90	8·15	1·82	1·31	0·44	0·28	0·27	0·22	....	100·17	0·122	32·70	49·20
3	"	"	2·03	3·28	78·08	12·28	1·86	1·68	0·61	0·31	0·32	0·04	....	100·49	0·075	37·95	40·13
4	"	Guisachan, B.C.....	1·58	2·62	83·56	8·57	1·20	1·23	0·32	0·14	0·30	0·05	0·43	100·00	0·077	47·51	36·05
5	"	"	3·29	5·98	77·58	8·58	1·65	1·32	0·51	0·26	0·29	0·06	0·48	100·00	0·228	24·28	53·30
6	"	"	3·82	6·34	75·05	11·11	1·69	0·42	0·63	0·32	0·37	0·03	0·22	100·00	0·245	37·74	37·31
7	"	"	3·40	6·89	75·72	9·40	1·21	1·35	0·53	0·26	0·33	0·09	0·82	100·00	0·251	30·60	45·12
8	"	"	1·35	1·99	83·42	9·37	1·59	0·73	0·43	0·35	0·27	0·18	0·32	100·00	0·044	21·59	61·83
9	"	Cowichan, B.C.....	2·88	6·90	67·24	19·29	1·33	1·55	0·38	.....	0·31	0·30	....	100·18	0·099	25·84	41·40
10	"	Quamichan Lake, B.C.....	3·05	4·42	84·45	6·16	0·73	0·32	0·08	.....	0·07	0·25	0·47	100·00	0·080	57·13	27·32
11	Surface.....	Victoria, B.C.	3·80	15·09	67·48	10·93	1·20	0·88	0·22	.....	0·18	0·03	0·19	100·00	0·572	15·04	52·44
12	At a depth of 18 in..	"	3·54	13·13	69·78	11·02	1·08	0·71	0·22	0·08	0·18	0·04	0·22	100·00	0·488	20·54	49·24
13	" 24 in..	" ..	1·93	4·54	79·09	11·73	0·99	1·20	0·25	.....	0·12	0·12	0·03	100·00	0·143	20·01	59·08

United States, yields, as a rule, potash between .1 per cent and 1.5 per cent. Good agricultural soil possesses on an average between .25 per cent and 1.0 per cent; soils in which clay predominates are usually the richest in potash.

Phosphoric acid.—Also derived from the disintegration and decay of the rocks forming the inorganic basis of the soil. The percentage of this constituent, as determined by the method already referred to, varies usually between .15 per cent and .5 per cent.

Lime ranks next in importance amongst the inorganic elements of plant food. Directly and indirectly, lime is of great service to growing crops, and many agricultural authorities place the minimum limit in a soil for good returns at 1.0 per cent. The presence of lime encourages nitrification of the humus and also sets free inorganic elements of plant food.

Organic Constituents.—Humus or semi-decayed vegetable matter, though not in itself direct plant food, plays a most important part in soils. Its presence in right proportions improves the physical condition of a soil, chiefly in that it regulates its temperature and degree of moisture. By the decomposition of humus carbonic acid gas is liberated, which in turn sets free mineral plant food in the soil.

Nitrogen.—An element of great value agriculturally, and contained to a very large extent in the humus in a condition not immediately available for plant use. Nitrification, or the conversion of this nitrogen into soluble forms, is brought about by the agency of micro-organisms known as bacteria, ferments, etc. The presence of lime, good tilth and suitable climatic conditions of moisture and warmth, are the factors that are favourable to their development. The total nitrogen in a soil of good average fertility lies between .2 per cent and .5 per cent—though there are many soils yielding lucrative crops, the nitrogen of which falls below .2 per cent. Very rich soils contain between .5 per cent and 1.0 per cent of this element.

AVAILABLE PLANT FOOD IN THE SOIL.

The data enumerated in the foregoing table, like those given in former reports on soil analysis, represent the results obtained by the method generally in vogue and already referred to as that adopted by the Association of Official Agricultural Chemists of the United States. They consequently express the amounts of plant food dissolved out of the soil by strong acid, and give no indication of the proportion of those constituents that may be of immediate use to growing crops, *i.e.*, of the *available* plant food. Though such results are, as I have pointed out on previous occasions, of great value in indicating the general richness or poverty of soils in certain elements, it is obvious that a knowledge of the percentage of these constituents in an *immediately available* condition would be of immense value in diagnosing the present fertility of the soil, and be of great assistance in outlining a truly economical system of manuring.

One of the chief means whereby the constituents of the soil are rendered available, is by the acid exudations of plant rootlets. To determine the acidity or strength of these exudations, Dr. Bernard Dyer, an English chemist, has lately made an extended investigation, in the course of which he determined the acidity of the root sap of about 100 plants, belonging to 20 natural orders. His results and methods are given *in extenso* in a valuable paper in the Journal of the Chemical Society for March, 1894. He states that "the average sap-acidity" of the roots of the 100 plants expressed as crystallized citric acid is .854 and "the average sap acidity for the roots of the 20 orders, .910." After a lengthy discussion of details and results, he concludes that the average acidity of root sap may be represented (as regards solvent power) by a 1.0 per cent solution of crystalized citric acid. Dr. Dyer continued his researches by ascertaining the percentages of potash and phosphoric acid taken out by a 1.0 per cent solution of citric acid from certain soils from experimental fields at Rothamsted, the history of which for many years, as regards the manures applied and the yields obtained, was known. It will not be now my purpose to discuss the details and data of this research, interesting and instructive as they may be; it must suffice at present to point out that Dr. Dyer ascertained certain facts with regard to the amounts of the above named mineral ingredients

contained in soils, soluble in this solvent (and hence to be considered as immediately available), and secondly with respect to the proportion so available to the total amount of such constituents. Thus, in one instance, Dr. Dyer found in a soil to which no manure had been applied since 1852, that the total phosphoric acid amounted to 2,503 pounds per acre, and the phosphoric acid soluble in 1 per cent citric acid solution amounted to 139 pounds per acre ; soil from the same field, but to which superphosphates had been applied annually since the above date, contained total phosphoric acid 4601 lbs. per acre, and phosphoric acid soluble in 1 per cent citric acid, 1170 lbs. Without entering into any consideration of the amounts of phosphoric acid taken from the soils by the successive crops, it will here serve our purpose to give Dr. Dyer's averages as follows :—

“ The average percentage, as we have seen, of total phosphoric acid in the eight plots receiving no phosphates was 0.106 ; in the eight plots receiving phosphates, 0.178. These numbers are nearly in the ratio 1 : 1.7.

“ Now, however, let us consider the percentages of phosphoric acid soluble in the 1 per cent solution of citric acid.

“ We find that the average percentage thus found in the eight plots receiving no phosphates was 0.0078 ; in the eight soils that received phosphates, it was 0.0463. These percentages are in the ratio of nearly 1.6. The difference in the percentages of phosphoric soluble in dilute citric acid is thus comparatively overwhelming.”

He sums up as follows :—

“ From a careful consideration of the whole of the results, it would perhaps not be unreasonable to suggest that, when a soil is found to contain as little as about 0.01 per cent of phosphoric acid soluble in a 1 per cent solution of citric acid, it would be justifiable to assume that it stands in immediate need of phosphatic manure.”

In potash he obtained results of an analogous character, and finally suggests that the limit that should be regarded as indicating the non-necessity of the application of special potash fertilizers at probably .005 per cent of potash soluble in the solvent now spoken of.

We have here spoken at some length of these important results, since it is our purpose to adopt this method of examination in addition to the process used in future investigations on Canadian soils, and this explanation will serve to make the data the better understood by our readers. In the present report we give the figures obtained by this citric acid method on soil samples Nos. 10, 12, 13, 14, and these will be discussed when considering the other data respecting them.

Soil No. 1.—This sample was forwarded by Mr. Geo. A. Smith, government agent, from Alberni, B.C. Mr. Smith writes as follows :—

“ This land, of which there is a large area in this district, when first ploughed, yields nothing ; the second year it is better, and after several times ploughing grows fairly good crops of clover and pease. It is known as ‘ Fern and Salal soil,’ for the reason that on this virgin soil these plants grow luxuriantly, crowding out to a great extent other vegetation.”

This soil is of a deep red colour and though of sandy appearance contains a fair amount of clay. It shows a decided acid reaction when tested with litmus paper. The air-dried sample consisted of—

	Per cent.
Gravel and small stones	17.95
Fine earth.....	82.05
	<hr/>
	100.00

The analysis proves that this soil contains a very large amount of iron, part of which possibly is present in a condition not fully oxidized. This would account for the statement above given that, while poor crops are obtained at first, better yields result on further tillage, which latter would have the effect, by exposure to the air, of completely oxidizing the iron compounds and correcting sourness. It should also be remembered that the action of the atmosphere is one of the chief factors in rendering assimilable the locked-up plant food in the soil.

In all probability, an application of lime would assist in bringing this soil into a more immediate state of fertility, particularly as the amount of this constituent lies below the average present in good productive soils.

Further, it is poor in potash and somewhat deficient in nitrogen. For the first of these an application of wood ashes is to be recommended and for the latter barnyard manure and the turning under of a green crop of legumes such as clover or pease.

Underdrainage would undoubtedly prove beneficial for this soil, and would serve to more quickly bring it into condition.

It may be remarked that this sample, though very similar in colour to the common red soil of the benches, contains more clay than the specimens of the latter hitherto examined by us.

Soils Nos. 2 and 3.—These are from Okanagan Mission, being sent by Mr. C.S. Smith of that place. They had grown timothy and clover for many years, but, according to accounts, had never been manured. Their physical appearance and condition may be described as follows:—Of a light gray colour, showing but little organic matter, and wanting in mellowness and the general features of good tilth; No 2, more particularly, on drying, cakes into hard masses.

From the data obtained, it would appear that they were most deficient in humus and its concomitant nitrogen, and the treatment involving the use of organic manures already suggested might be here again repeated. By this means, with underdrainage and careful culture, the tilth of these soils may be improved. Suggestions are asked regarding the treatment of these soils for hop growing, and I would therefore recommend bone meal and wood ashes as suitable suppliers of the constituents required by this plant. Bone meal contains nitrogen and phosphoric acid in a form that is gradually rendered assimilable, and English experience goes to show that this fertilizer is particularly adapted to hop culture. Though these soils could not be termed deficient in lime, a dressing of this material would in all probability improve the condition of the soil and enhance its productiveness.

Soils Nos. 4, 5, 6, 7 and 8. Are from the ranch of His Excellency the Governor-General, at Guisachan, British Columbia.

No. 4.—Light gray, sandy soil containing small lumps of agglutinated particles which easily crush between the fingers; when moistened, does not become pasty or sticky, falling apart on drying; under the microscope, shows a considerable amount of very fine sand; possesses but few root fibres, and, from appearance, is poor in humus or partially decayed organic matter.

No. 5.—Soil, dark gray approaching black, in which sand predominates, very little in the form of powder, but principally as lumps, which are tough and resist pressure between the fingers; becomes several shades darker on moistening, but not sticky; fairly homogeneous, and, judging by appearance, contains a fair amount of humus.

No. 6.—A dark gray loam, very similar in shade of colour to No. 5, in powder and in lumps, the latter easily breaking down by the pressure of the fingers; on treatment with water, same results as with No. 5; in organic matter, also evidently similar to sample No. 5.

No. 7.—Sandy loam, dark gray, but somewhat lighter than the two preceding soils; in powder and lumps, most of the latter easily crushed between the finger and thumb; on treatment with water, behaves as samples No. 5 and 6; appears to have about the same proportion of humus as No. 5 and No. 6.

No. 8.—Light gray, sandy soil (compared with No. 1, has not the yellowish shade of the latter); received as tolerably large lumps which are very hard, resisting all attempts at crushing in the hand; on moistening, does not become sticky, but mass on drying is very tough; apparently very little organic matter.

Soil No. 9 Was taken at Cowichan. It was forwarded by Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia. The sample is from the common red soil of the bench land.

In appearance, it most resembles the sample from Alberni (No. 1), being a "deep red, sandy loam." It is said to give very poor returns for the first year or two, but to

improve on tillage. The causes for this and the remedy are probably the same as those indicated for the Alberni soil. In potash it is richer than the latter, containing an average percentage of that element. In the amount of its phosphoric acid it is very similar, but in nitrogen and humus it is poorer. Organic manures and especially "Green manures" are advocated for such light soils. For a light soil, apt to leach, it is always better when applying soluble fertilizers to give dressings of small quantities annually and to supply as far as possible nitrogen in the form of an organic manure, as above recommended. The object should be, first, to feed the immediate crop, and, secondly, to improve the retentiveness of the soil by more lasting fertilizers.

The determination of the amounts of available potash and phosphoric acid ascertained by the citric acid method afforded the following data:—

Available potash.....	·0089
Available phosphoric acid.....	·0171

While these amounts do not fall below the limits named by Dr. Dyer, they are however, such as to suggest that both potash and phosphoric acid would prove beneficial and give good returns in increased crop yields.

Soil No. 10.—This sample was also sent by Mr. J. R. Anderson. It is grayish white and of a clayey character. It occurs in several beds about Quamichan Lake and was supposed to be marl or at least a soil rich in lime. On account of its very fine grain it had proved a difficult soil to work.

Both in composition and appearance it has the characters of a sub-soil. In all the essential elements of fertility it is very poor. The probabilities are that the surface soil overlying this had been burnt off, thus leaving a soil destitute of plant food and quite unfit to support vegetable life. It would take many years of careful culture to bring such a soil into a state of fertility. Underdraining and green manuring are among the chief means to be used for improving it, mechanically and chemically.

Soils Nos. 11, 12 and 13 were furnished by Mr. R. M. Palmer, Inspector of Fruit Pests, of the Department of Agriculture of British Columbia. They were "taken from a valley field near Victoria, Vancouver Island, and are fairly representative of the land to a depth of about 2 feet." Mr. Palmer further says: "The field from which these samples were taken had never been manured, other than by the droppings of animals when in pasture, and has been cropped with grain the last three years. The land is similar to a large amount of what is usually considered first-class farming land."

No. 11 represents the upper 6 inches of the soil. When air-dried it is a dark brown loam, approaching black. It is of excellent texture, the small lumps that make up the mass of the soil powdering easily between the fingers. It is homogeneous throughout, containing clay and humus in good proportions.

In nitrogen this soil ranks very high, while the large amount of organic matter present should prove of value in regulating the soil's temperature and improving its retentiveness.

This soil, as regards potash and phosphoric acid, cannot be considered rich, the amounts of these important constituents of plant food being below those found in the best soils.

For fruit trees, both large and small, an application of these last named ingredients would undoubtedly prove of value, nitrogen being already present in sufficient quantities, providing the season allows the nitrification of the humus to proceed. The under-drainage of the soil would materially assist in this useful process. To supply potash and phosphoric acid, wood ashes may be specially recommended. This excellent fertilizer also furnishes lime, a constituent in which the soil under consideration is not rich.

No. 12 represents the soil between the depths of 12 inches and 18 inches, immediately beneath the preceding sample. In physical appearance and condition it is very similar to the surface soil just discussed. This resemblance is still further emphasized on comparing the chemical data of the two samples. As might be expected, it is somewhat poorer in organic matter and nitrogen than the soil above it; the amounts of total phosphoric acid and potash are, however, identical. These facts would show that the surface soil practically has a depth of 18 inches.

No. 13 was taken from the soil immediately beneath No. 12, and is representative of the soil between the depths of 18 inches and 24 inches. There would appear to be no clear line of demarkation between the surface and sub-soils. This sample is chiefly of a yellowish gray colour, with grains of black soil scattered throughout its mass.

Considered as a sub-soil, it must be regarded as of good quality, from both a chemical as well as a mechanical standpoint. The table of data indicates the differences in composition between this soil and those that overlie it.

The percentages of potash and phosphoric acid in these soils already discussed, represent what may be termed the *total* of their constituents. It will be now interesting to consider the proportions or percentages of these elements that may be looked upon as more or less *immediately available* for plant use, *i.e.* the amounts extracted by the one per cent citric acid solution before referred to.

COMPARISON of "Available" with "Total" amounts of Potash and Phosphoric acid.

SOIL.	POTASH.			PHOSPHORIC ACID.		
	Total Potash.	Available Potash.	Percentage of total Potash available for plant use.	Total Phosphoric acid.	Available Phosphoric acid.	Percentage of total Phosphoric acid available for plant use.
No. 11, Surface 6 inches ..	·22	·00483	2·20	·18	·01020	5·66
No. 12, between 12 & 18 ins.	·22	·00299	1·36	·18	·01055	5·85
No. 13, between 18 & 24 ins.	·25	·00169	·64	·12	·00588	4·90

These results are important in showing that the upper or surface portions of the soil contain a much larger amount of the mineral constituents, potash and phosphoric acid, in an available condition for plant use, than the underlying soil. This largely accounts for the fertility or productiveness of the surface soil as compared with that of the sub-soil. While the total amounts of these elements in the sub-soil may not be less than those in the surface soil, the percentage of the amount present in a condition more or less immediately assimilable is very much less in the former than in the latter. The factors that conduce to this conversion of the mineral matter are the usual atmospheric agencies—water, air and temperature, and in some measure, the nitrification and decomposition of the soil humus, the action of these latter processes being greatly increased by judicious culture—drainage, ploughing and other tillage operations.

NATURALLY OCCURRING FERTILIZERS.

SWAMP MUCK.

Since the attention of Canadian farmers was first called, now seven years ago, in our reports, to the value of swamp muck deposits as a fertilizer rich in nitrogen and humus, the use of this naturally occurring source of plant food has become widely prevalent. Inquiries as to the best methods of applying muck, many being accompanied by samples for report as to value, are continually being received from all parts of the Dominion. The approximate composition of the specimens analysed during the past year is given in the following table, which also shows the percentages of the important constituents, nitrogen and humus (vegetable and organic matter), in the air-dried material. Of these samples, seven were from Prince Edward Island, one from Nova Scotia, three from New Brunswick, three from Quebec, and three from Ontario. The nitrogen varies from 11 pounds per ton to 54.4 pounds per ton in the air-dried substance, which shows that, other factors being equal, the latter as a nitrogenous manure was worth five times the value of the former. As pointed out in former reports, however, the average amount of nitrogen in muck after drying by exposure, is between 30 and 35 pounds, though a large number contain about half that quantity :—

ANALYSES of Swamp Muck (air-dried), 1895.

Number.	Locality.	Sender.	Nitrogen.		Organic and Volatile Matter.	Sand and Clay.	Mineral Matter soluble in Acid.	Water.	Remarks.
			Per cent.	Pounds in one ton of air-dried muck.					
1	Cape Traverse, P.E.I.	E. Crosby	1.61	32.4	62.12	12.07	15.74	16.07	Good average specimen.
2	" " " " " "	" " " " " "	1.56	31.2	45.05	33.13	11.37	10.45	" " " " " "
3	Lot 11, P.E.I.	W. J. Kilbride	.714	14.3	46.78	20.11	14.73	18.38	Could be used with advantage for composting, and as absorbent.
4	Mill Cove, P.E.I.	W. McGrath..	.792	15.8	.....	.....	.....	.....	A fair sample; very acid while fresh.
5	Lot 27, Rock Barry, P.E.I.	F. McDonald..	.694	13.88	83.65	4.45	2.02	9.88	Suitable as an absorbent and for composting.
6	Little Harbour, P.E.I.	A. Mooney....	.94	18.8	80.77	5.85	2.44	10.94	Below the average, but nevertheless valuable.
7	" " " " " "	" " " " " "	.55	11.0	20.65	67.00	7.19	5.16	Of the nature of a good soil.
7	Pictou, N.S.	Jas. McDonald	2.72	54.4	72.70	4.79	5.93	16.58	Very rich in nitrogen.
9	Hillsboro', N.B.	S. S. Steens...	.70	14.0	65.41	.20	7.41	26.98	In excellent condition for absorbing purposes.
10	Rogersville, N.B.	A. Thibodeau.	.819	16.4	70.85	2.40	17.45	9.30	Average amount of nitrogen.
11	Lower Woodstock, N.B.	A. W. Hay. ...	1.61	32.2	50.71	31.07	9.66	8.56	
12	Walton, Que.	A. Lemire. ...	1.70	34.0	73.83	2.71	7.46	16.00	A very good sample.
13	Shawville, Que.	E. Hodgins...	1.61	32.2	56.42	9.58	7.18	26.82	Surface sample. An excellent sample.
14	" " " " " "	" " " " " "	2.27	45.4	73.92	.79	6.70	18.59	18 inches below surface. An excellent sample.
15	Orono, Ont.	R. Moment...	1.89	37.8	55.23	14.45	13.92	16.40	Of a peaty nature; a go absorbent.
16	Phillipsville, Ont.	A. Acheson...	1.85	37.0	66.01	18.68		15.21	A muck soil rich in nitrogen.
17	" " " " " "	" " " " " "	1.875	37.5	65.22	20.06		14.72	" " " " " "

A close inspection of the data makes it clear that the percentage of organic matter (humus) is not always a safe indication of the sample's richness in nitrogen. Thus

sample No. 5, contains 83.65% of organic matter, and .694% of nitrogen, while No. 15 possesses 55.23% of organic matter and 1.89% of nitrogen. In the first instance the humus contains .83% of nitrogen, in the latter, 3.4% of nitrogen. The humus of mucks is seen therefore to vary much in its nitrogen content. It has been established that the humus of arid soils, though small in quantity, contains a much larger proportion of nitrogen than does the humus of soils in humid districts, so that there is a certain equilibrium in the amount of soil nitrogen in both these classes of land. It is evident that there is an analogous case as regards the variation in nitrogen in our mucks. Whether the cause is similar, cannot as yet be definitely said, but in all probability the difference is not so much due to variations of the nitrogen in the originating vegetable matter as to the conditions of temperature and moisture under which it has been converted into muck and preserved in the swamps. Though not invariably the case, it would appear that the lower layers are somewhat richer in nitrogen than the surface layer.

Undoubtedly the greatest benefit from muck is to be derived after its use as an absorbent in and about the farm buildings. The air-dried material will hold many times its own weight of fluid and can therefore be used to good advantage in the cow stable, pig-pen and barn-yard to save the liquid manure from going to waste. The subsequent fermentation in the manure heap induces conditions favourable to the development of the nitrifying organisms and thus a fertilizer rich in available nitrogen compounds is produced.

With respect to the general instructions in making and using muck composts, the reader is referred to my report for 1894, in which the subject is treated at some length.

MARSH, RIVER AND MUSSEL MUDS.

Considerable dispute still exists as to the exact value of these materials as fertilizers. This disagreement is due to many causes, but chiefly to the differences in the composition of the materials applied, in the amounts employed and in the character of the soils upon which they are used. Many samples have been found to be fairly rich in nitrogen and organic matter—and in this respect somewhat similar to swamp mucks—while others abound more particularly in carbonate of lime. There are also others which can only be regarded as of the nature of fair or good soils, since their composition, as revealed by analysis, is very similar to the latter.

The excellent results that are sometimes obtained from the use of the muds last named, may be due in a large part to the heavy amounts applied per acre—often from 150 to 200 loads—and to mechanical effect they exert upon the tilth of the soil. Of this class, is the following sample sent by Mr. D. Nicholson, of Little Sands, Prince Edward Island. This was of a gray colour, light and sandy and bound together by many root fibres, and in appearance, not rich in humus. This is not strictly comparable to marsh muds; both as to origin and appearance, it more closely resembles the so-called river muds:—

ANALYSIS OF MARSH MUD (AIR-DRIED) FROM LITTLE SANDS, P.E.I.

Water	1.66
Organic and volatile matter	11.58
Sand and clay (insoluble in acid).....	76.87
Oxide of iron and alumina ($\text{Al}_2\text{O}_3, \text{Fe}_2\text{O}_3$).....	6.68
Lime (CaO).....	.19
Magnesia (MgO).....	1.35
Potash (K_2O).....	.54
Soda (Na_2O).....	.80
Silica (SiO_2).....	.03
Phosphoric acid (P_2O_5) .....	.15
Undetermined .....	.15
	<hr/>
	100.00
Nitrogen, in organic matter.....	.283

It will be noticed that none of the essential ingredients of plant food (nitrogen, potash and phosphoric acid) are in larger amounts than in fairly fertile soil. Neither is it rich in lime, which may be regarded as both a direct and indirect fertilizer. The possibility is that the plant food in these muds is in a more readily available form than that of ordinary soils. To determine this point, we hope to conduct a series of experiments as opportunity offers. In considering the value of such a material, the cost of cartage must be taken into consideration, as well as the effect of the mud upon the physical condition of the soil.

A sample labelled "Marsh Mud" was forwarded by Mr. F. S. McPhail, of Orwell, P.E.I., for examination. This specimen, however, was not a tidal deposit and, consequently, not similar in character to the marsh mud of the Bay of Fundy. It was found along the banks of a "salt water river" to a depth of 4 to 5 feet and "covered in summer with a strong growth of excellent grass." Evidently, this material is made up of the detritus brought down by the river, and the roots of growing vegetation, together with the finely ground-up rock matter, shells and organic debris deposited by the sea. Its composition is tabulated as follows:—

ANALYSIS OF MARSH MUD (AIR-DRIED) FROM ORWELL, P.E.I.

Water	3.12
Organic and volatile matter	23.46
Sand and clay (insoluble in acid)	59.43
Mineral matter (soluble in acid).....	13.99
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	100.00
Phosphoric acid (P_2O_5).....	.18
Potash (K_2O).....	.76
Nitrogen687

The amounts of nitrogen and organic matter are seen to be quite large for a material of this character, while the other elements of plant food are by no means lacking.

The physical condition of this was very fair, though quite capable of improvement by composting. Much of the nitrogen still exists in undecomposed root fibre, which requires to be broken down by active fermentation with barn-yard manure. A small quantity of common salt is present, but not sufficient to act deleteriously to vegetation. In this connection it may be pointed out that on many soils, salt in small amounts acts beneficially by setting free potash, a valuable plant food element. It also improves the tilth of heavy clay soils, by flocculation of the granules and rendering the soil less plastic. It is quite possible that the good effects of certain marsh muds are due to the presence of the traces of salt they contain.

A sample of mud, forwarded by the Hon. Senator Arsenault, from Wellington, P. E. I., gave the following data on analysis:—

ANALYSIS OF RIVER MUD (AIR-DRIED) FROM LOT 15, WELLINGTON, P.E.I.

Water	1.02
Organic and volatile matter	9.90
Clay and sand (insoluble in acid).....	72.29
Mineral matter (soluble in acid).....	16.79
	<hr/>
	100.00
Nitrogen, in organic matter.....	.262
Phosphoric acid.....	.15
Lime, present in small quantity.	

This mud was dug in the winter from Jacques Creek and is described as "the accumulation of marsh and swamp muds, sea-weed, &c., carried by high tide into the bottom of this narrow river or creek." It contains a good deal of sand, is of a gray colour and dries on exposure into somewhat hard lumps. As regards the essential

elements of fertility, it resembles very closely the sample from Little Sands already described, being similar in composition to a good soil of more than average fertility.

Of similar character and appearance to the above was the specimen sent by Mr. G. H. Ross, of Ross Corners, P. E. I. It was, however, much richer in nitrogen than either of the foregoing, containing 1.61 per cent of that element.

Our analysis of a sample of river mussel mud, sent by Mr. G. F. Miller from Bear River, Digby Co., N.S., affords the following data:—

ANALYSIS OF MUSSEL MUD (AIR-DRIED) FROM BEAR RIVER, DIGBY CO., N.S.

Water.....	.90
Organic and volatile matter,.....	7.23
Clay and sand (insoluble in acid).....	53.00
Mineral matter (soluble in acid)*.....	38.87
	<hr/>
	100.00

*Containing carbonate of lime.....	29.62
Nitrogen, in organic matter .....	.225
Phosphoric acid.....	Considerable traces.

As received, it was of a light gray colour and contained a large number of small shells. It differs essentially from the afore-mentioned sample in containing about 30 per cent of carbonate of lime.

In conclusion, I may state that the beneficial action of such “muds” does not entirely depend upon the nitrogen and organic matter they possess (as is the case with swamp mucks), but also upon the somewhat small quantities of the other essential elements of fertility they supply, or to the carbonate of lime they contain.

Muds must be regarded as “amendments” rather than fertilizers which contain plant food in considerable quantities. In many ways, both chemically and physically they may be valuable, but as far as possible their use should be supplemented with more assimilable and stronger fertilizers. Undoubtedly green manuring, *i.e.*, turning under a green crop, preferably clover or pease, will prove one of the cheapest and at the same time one of the most effective methods of treatment when applying “muds” as a fertilizer.

FERN LITTER—BRACKEN (*Pteris Aquilina* var. *Lanuginosa*).

In many parts of Canada and more especially in British Columbia, large quantities of the common bracken fern grow, and inquiries have been received regarding its manurial value, when ploughed under or first used as litter. For this latter purpose it may be used with advantage, having a well marked absorptive capacity for liquids. A sample of the the air dried fern was received from Mr. T. Wilson, of Loch Erroch, B.C., and the analysis was made with the following results:—

ANALYSIS OF BRACKEN (air dried).

	Percentage Composition.	Lbs. per ton.
Mineral matter or ash.....	6.78	135.6
Phosphoric acid.....	.43	8.6
Potash.....	1.52	30.4
Nitrogen.....	1.29	25.8

When used as a litter, the subsequent fermentation in the manure pile rots the fibre and sets free the plant food, which, as the analysis shows, is present in notable quantities.

GREEN MANURES.

On many farms in the Dominion, and more especially in the newly settled up districts, sufficient stock is not kept to supply the necessary manure for maintaining the fertility of the soil. As yet, the use of commercial fertilizers is not widespread, owing in part to their apparently high price, and to the lack of the requisite knowledge to use them economically. There are, however, in many instances, materials more or less cheaply obtained which can be employed with profit when their nature and method of application are understood. Among such might be mentioned the deposits of swamp muck, marl and gypsum; fish refuse, slaughter-house offal, and animal matter of all kinds; sea-weed, and decaying vegetable matter generally. But whether these are obtainable or not, every farmer may improve his soil, be it light or heavy, by green manuring; that is, by ploughing under a green crop, preferably of a legume (clover, pease, &c.) and while in flower.

By the acid exuded from the rootlets, by the carbonic acid of the atmosphere, and by other means, plants are enabled to make use of much of the mineral matter of the soil. This is stored within their tissues, together with water and organic matter, the latter being derived in the gaseous form from the atmosphere, and elaborated by the leaves. The turning under of a green crop, therefore, supplies for succeeding crops a store of readily digested plant food—of potash, phosphoric acid, and nitrogen. In addition to these essential elements of fertility, the decaying organic matter from the turned-under crops acts beneficially in conserving the soil's moisture, a most important matter for light and gravelly soils. Further, the presence of this organic matter serves to regulate the soil's temperature, and its decay brings about the solution of inert forms of plant food already present.

Buckwheat, rye and clover are the principal crops used for green manuring. Buckwheat has been found very useful, as a growth may be obtained on comparatively poor soils, soils that in the first instance would not support a growth of clover, and undoubtedly both it and winter rye when turned while green vastly improve many soils. The legumes (clover, pease, beans, etc.), however, are still more valuable, inasmuch as they not only furnish a supply of readily digestible food obtained from the soil, but add a store of nitrogen derived from the atmosphere. It is owing to this power of atmospheric nitrogen-assimilation (which takes place by the agency of certain micro-organisms in the tubercles on the rootlets) that the legumes have been termed "nitrogen collectors" in contradistinction to all other plants, which are classed as "nitrogen consumers." The legumes appear to be richest in this element at the period of flowering, a fact which suggests this time as the best for ploughing under the crop. Since nitrogen is the most expensive of all plant foods, the knowledge of the amount of this element added to the soil per acre by manuring with clover, will prove of interest and value to our readers. The results given in the following table have been obtained from an experiment inaugurated by the Director of the Experimental Farms. Among other interesting and instructive data, the table shows the large amount of nitrogen stored up in the roots, stubble and foliage of clover. This nitrogen, on turning under the crop, becomes available plant food. The value of this crop as a nitrogen accumulator, even when the clover is not turned under, is very apparent. Since these data are more fully discussed in the report of the Director (page 26), it will be unnecessary here to consider them in further detail.

NITROGEN in Clover crop.

Clover cut and roots dug : on 25th May, 1895.	Weight of material in grammes per square foot.	Weight of material in pounds per acre (calculated).	Percentage of "dry matter."	Weight of "dry matter" in pounds per acre.	Percentage of Nitro- gen in fresh ma- terial.	Pounds of Nitrogen per acre in fresh matter (calculated).
One year's growth—						
Leaves and stems (green).....	209·0	20,070·0	13·29	2,667·30	·505	101·3
Roots, to a depth of four feet.....	119·5	11,476·0	16·19	1,857·96	·423	48·5
Semi-decayed material on surface of ground.....	32·0	3,073·0	23·53	723·07	·732	22·5
Total.....		34,619·0		5,248·33		172·3
Two year's growth—						
Leaves and stems (green)	117·0	11,235·0	19·51	2,191·95	·447	50·0
Roots, to a depth of four feet	193·0	18,535·0	18·85	3,483·85	·354	61·5
Semi-decayed material on surface of ground.....	13·0	1,248·0	35·73	445·91	·410	5·1
Total.....	...	31,018·0		6,121·71		116·6

All the nitrogen in the clover crop is not taken from the atmosphere, but under favourable circumstances a large portion of it is derived from that source. If we assume that a fair crop of clover per acre takes 75 pounds of nitrogen from the air and the value to be 15 cents per pound, we have \$11.25 worth of ready assimilable nitrogen for this area, and this is in addition to the valuable humus and the store of plant food rendered available and obtained from the soil.

It is often found advantageous previous to sowing the clover to dress the land with gypsum or, still better, with wood ashes. If these are not obtainable, an application of lime or marl may be found of value. These materials not only furnish food for the clover and succeeding crops, but also assist in the nitrification of the clover when ploughed under. Clover requires potash and lime for its growth, and very often light soils, those especially benefited by green manuring, are deficient in these constituents. Wood ashes supply both potash and lime; lime, marl and gypsum furnish lime and assist in rendering available for the clover crop the potash locked up in the soil.

The chief features of green manuring may be summarized as follows:—

1. A large amount of humus is added to the soil which acts beneficially in:—

- Serving to increase the retentive power of light soils for moisture.
- Regulating and providing against the extremes of soil temperature.
- Opening up and improving the tilth of heavy soils.
- Furnishing, by means of the products of its decomposition, available mineral food from the inert rock matter of the soil.

2. A considerable quantity of previously unavailable soil plant food is presented thereby in a condition already digested and easily assimilated by future crops.

3. The plant food thus supplied is not as readily lost by drainage as that in certain forms of commercial fertilizers and hence green manuring is specially adapted for the permanent improvement of light soils.

4. When the legumes are used, there is a large gain to the soil in nitrogen, and this gain is from a source that otherwise the farmer cannot draw upon. Nitrogen is a costly and valuable element of fertility, and its presence in large quantities (.5 per cent to 1 per cent) is always indicative of a fruitful soil.

When clover is used and stock is kept that can consume the crop, the most profitable plan would be to feed off the first cutting and to turn under the second growth. In this way a highly nutritious fodder is obtained and in the manure produced about 75 per

cent of its plant food may be returned to the soil, and this in addition to the fertilizing material in the roots and second crop.

MOSS LITTER.

The absorptive capacity of moss turf has for many years been recognized in Europe as establishing a high value for this substance as a bedding material. In Sweden and Holland, and of later years in England and the larger cities of the United States, moss litter has been used extensively in stables and found to be highly satisfactory, both in keeping the animals dry and the surrounding atmosphere free from odour.

Large bogs or moors, some of them miles in extent, occur in Canada made up (principally) of several species of Sphagnum moss. These in many places are many feet in depth, the growing surface of moss overlying the more or less closely packed turf composed of the remains of preceding generations. The preparation of the litter is simple and comparatively inexpensive, the piled moss being dried by the sun and wind (preferably after exposure in heaps to a winter's frost). The turf is then placed in a cylinder containing a revolving toothed roller and the fine material thus resulting is baled under pressure in a manner similar to that in vogue for preparing hay for shipment.

The absorptive capacity of moss is much greater than that of straw or peat. This power of taking up and retaining fluids and gases varies according to—

1. The species of moss.
2. The dryness of the moss.
3. Its fineness.
4. Its degree of decomposition.

The species of moss.—Some mosses in an air-dried condition will retain but twice their weight of water, while others will absorb 15 to 20 times that quantity. This absorptive power is due to the botanical structure of the plant, the large cells of the stalks and leaves being distended by capillary attraction. As the microscopical structure varies in the different mosses, so will this physical property vary.

The dryness of the moss.—Providing the organic structure of the moss has not been injured in the process of drying (as by the use of artificial heat), the drier the moss the more liquid will it retain. Artificial drying has been found to materially injure, if not entirely destroy the absorptive capacity of moss litter.

Its degree of fineness.—While the absorptive capacity of moss may be considerably increased by teasing, it has been found that too fine a state of division is detrimental to the value of the material as an absorbent.

Its degree of decomposition.—The greater the decay, the lower the absorptive power. Hence the recent grown upper layers consisting of bright loosely-textured fibrous moss, are the best to employ as litter.

Moss litter has in a large degree the ability to absorb ammonia and other gases. This absorption is partly chemical, but chiefly mechanical. By careful experiment, it has been shown that the air of stables in which moss litter was used was free from ammonia, and already we have abundance of Canadian testimony to corroborate the statement. It is this feature of moss litter that specially commends it as a bedding material in cities.

At the instigation of Mr. R. D. Wilmot, Jr., M.P., samples of moss litter were forwarded me last summer by Edward Jack, Esq., of Fredericton, N.B., from several of the larger bogs of New Brunswick. I am much indebted to Mr. Jack for information respecting the occurrence and properties of this material. He has conducted several valuable experiments both in the preparation and use of the moss as a litter. A most interesting and instructive account of moss litter was prepared by Mr. Jack for the Bureau of Mines for the province of Ontario, and appears in the report of that department for 1893.

My results on the samples here referred to are as follows :—

ANALYSES of Moss Litter.

No.	Designation.	Locality.	Moisture.	Ash.	Nitrogen.	Absorptive Capacity.
1	Artificially dried.	Musquash, N.B.	23·01	1·06	0·57	623
2	Open air dried.....	"	19·44	1·45	0·71	905
3	Upper layer.....	Rustagonish, N.B.....	14·28	0·84	0·51	1666
4	" loose.....	Point Cheval, N.B....	13·53	2·30	0·38	1834
5	Lower layer compact.	"	14·25	7·88	0·48	1166

The above data were obtained on the material as received. With respect to the determination of absorptive capacity, the operation was as follows :—

The moss litter being weighed out into a copper gauze funnel and covered with a cap of the same material, the whole was immersed in water for 24 hours. The funnel and contents were then taken out and allowed to drip for ten minutes. The dripping then having ceased, a weighing was again made and the water absorbed was determined and calculated to a hundred parts of the moss, as recorded above. Samples No. 1 and No. 2 were prepared by Mr. W. F. Todd, of St. Stephen, N.B. It will be noticed that the operation of artificially drying the moss had seriously impaired its absorptive capacity. An experiment tried by us confirmed this fact. Some moss was dried all night at the temperature of 205 degrees F. Its absorptive capacity was entirely destroyed, as after one week's submersion in the gauze funnel it was only wet on the edges. Further, it may be remarked that both specimens show the presence of a comparatively large amount of water. No. 2 has a noteworthy percentage of nitrogen.

Samples 3, 4 and 5 are excellent, having a very large absorptive capacity and suitable in every respect for the manufacture of litter. No. 5, being from a lower layer, was compact in character and had a lower absorbent co-efficient than Nos. 3 and 4, compared with which it is consequently less valuable.

Mention has already been made of its usefulness in keeping stables dry and free from odour. It may now be remarked that the resulting manure has been found of excellent quality, giving the very best returns with all classes of garden and farm crops. The moss litter in itself contains a notable quantity of plant food (chiefly nitrogen) which in the subsequent composting is rendered available. In addition to the data given in the foregoing table, we have ascertained that the ash or mineral matter contains one-tenth of its weight (10·15 per cent) of potash. It is quite possible that the structure and composition of the litter assist in the development of the nitrifying organisms which bring about the conversion of the plant food into available forms.

INDUSTRIAL FERTILIZERS.

WASTE FROM A SHODDY FACTORY.

This is essentially a nitrogenous fertilizer, potash and phosphoric acid being present in little more than traces. The percentage of nitrogen in this material is very apt to vary, owing to the fact that now-a-days cotton is largely used to replace wool in all woollen goods, the former is very much poorer in this element than wool.

A sample obtained from a shoddy factory at Stratford, Ontario, when air-dried, gave the following figures on analysis :—

Water	5·58
Organic and volatile matter.....	87·05
Mineral matter.....	7·37
	<hr/>
	100·00
	<hr/>

ESSENTIAL ELEMENTS of fertility in air dried shoddy waste.

	Per cent.	Lbs. per ton.
Nitrogen	2·19	43·8
Phosphoric acid.....	·17	3·4
Potash.....	·15	3·0

This material when received contained a comparatively large percentage of water and was distinctly acid.

Shoddy waste decays but slowly in the soil ; its nitrogen is not readily available, and consequently it is always advisable to induce fermentation in the compost heap before applying it as a fertilizer. Except in warm, moist soils, it is very apt to remain for a long time unchanged and useless. Any organic and easily putrescible substance such as animal refuse, urine, &c., would prove useful in starting decomposition in the shoddy waste when mixed with it in the heap. Reduction to soluble form of the nitrogen in this material may also be brought about by treatment with lime and wood ashes. This method has in many parts of Europe been used successfully.

BONE AND MEAT MEAL OR TANKAGE.

This fertilizer is made from slaughter-house refuse, *e. g.*, bones, meat scraps, blood, offal and other waste materials. The raw material is cooked under a pressure of steam and the greater part of the fat, which would otherwise interfere with the beneficial action of the fertilizer in the soil, removed. The product after thorough drying is crushed or ground and bagged. This material must, therefore, be valued according to the amounts of nitrogen and phosphoric acid it contains and the fineness of its particles; for, providing the product is dry and does not cake into masses, the finer the granules the greater the surface exposed to the solvent action of the soil water. Like other organic manures, its decomposition in the soil assists in many indirect ways in increasing fertility, by improving the tilth and the power of retaining moisture and heat, and by the solvent action of the carbonic acid set free by its fermentation. Such fertilizers will, therefore, give the best returns in soils that are neither too wet, nor too light, nor too heavy ; for in them the conditions for active fermentation are most favourable. Unlike the more soluble chemical fertilizers—nitrate of soda, sulphate of ammonia, kainit and superphosphate—these organic manures do not yield immediately a large amount of available plant food ; on the other hand, however, they are more lasting in their effects, their results being noticeable often for many years.

It being desired to know the composition of the tankage or "bone and meat meal" manufactured by the St. Lawrence Chemical Co., Montreal, a sample was submitted to analysis with the following results:—

ANALYSIS of Tankage or Bone or Meat Meal.

Moisture.....	5.04
Organic and volatile matter.....	67.67
Mineral matter soluble in acid.....	26.65
Mineral matter insoluble in acid.....	.64
	<hr/>
	100.00
	<hr/>

	Per cent.	Lbs. per ton.
Nitrogen.....	8.92	178.4
Phosphoric acid.....	9.84	196.8

From the figures I conclude that the material is composed of about 25 per cent of bone and about 75 per cent of meat or other albuminous substances.

It may be noted that fertilizers of this character do not contain potash; they should therefore be supplemented with the latter element in some form (wood ashes, kainit, or muriate of potash) if a manure is required that will furnish all of the essential elements of fertility.

FRESH SLAUGHTER-HOUSE OFFAL.

The fresh material consists of entrails, trimmings, bones and other refuse of the slaughter-house. Its essential fertilizing elements are nitrogen and phosphoric acid. It is readily decomposed and consequently is excellent for composting with swamp muck or soil rich in humus. The process of fermentation that ensues converts the plant food in both materials into readily assimilable forms. Such a fertilizer properly prepared would not only be rich as regards nitrogen and phosphoric acid, but would also be quick acting. In these respects it is very similiar to fish refuse.

A sample of fresh offal forwarded from Orillia, Ont., afforded me the following data:—

COMPOSITION of Slaughter-house Offal (fresh).

Water.....	48.65
Organic matter (entrails, &c.).....	27.20
Mineral water (bones).....	24.15
	<hr/>
	100.00
	<hr/>
Nitrogen.....	1.97
Phosphoric acid.....	8.28

FERTILIZING CONSTITUENTS per ton of fresh Material.

Nitrogen.....	39.4 pounds
Phosphoric acid.....	165.6 "

REDUCTION OF BONE ON THE FARM.

In order to render the nitrogen and phosphoric acid of bones more immediately available as plant food, some method of reduction must be resorted to. The weight of bones produced annually on the farm scarcely warrants, in most instances, the purchase of a mill for grinding, and even when this plan is pursued the fat of the bones must first be extracted, for the presence of oil would prevent the fine grinding of the bones and the ready decomposition of the material in the soil.

The method of reduction with oil of vitriol (resulting in the production of superphosphate) is not to be recommended for the farm, owing to the great care that it is necessary to exercise in handling such a dangerous substance.

When there are only a few bones to treat, the simplest way is to put them in a fermenting manure pile or in the compost heap; when the quantity is large, the following plan will be found advantageous:—

In a water tight barrel or wooden tub, place alternate layers of bones and unleached wood ashes, the layers being about six inches thick, and the lowest and uppermost being of ashes. Drive several wooden stakes through the mass to the bottom and moisten the whole well with the water. After a few weeks withdraw the stakes and keep the mass damp by pouring water into the channels so left. At the expiration of a month thoroughly mix the mass and moisten afresh. Repeat this operation twice at intervals of two months, and the bones should then be completely reduced. If bone meal is used, it may be mixed with wood ashes in proportion of one ton of the former to five barrels of the latter, the mixture being treated with water in a barrel as already described. When wood ashes are not procurable, a strong solution of lye may be used. About five pounds of the concentrated lye should be sufficient for 100 pounds of bones.

When the bones are quite soft, the mass should be spread out in a thin layer to dry. It should then be thoroughly powdered and mixed with loam for convenience in distribution on the land. As this fertilizer contains all three of the essential elements of fertility in a soluble condition, it should be preserved until wanted under cover from rain.

BASIC PHOSPHATE OF LIME AND POTASH.

This fertilizer was prepared by Messrs. E. A. Barnard and H. Nagant, of Quebec, by fusing together finely ground mineral phosphate, carbonate of potash and sand. By direction of the Honourable Minister of Agriculture, analyses were made of the two samples forwarded, with a view of ascertaining the percentages of phosphoric acid and potash contained in them and the proportion of these constituents that might be regarded as more or less immediately available for plant food.

ANALYSES.

	No. 1.	No. 2.
Phosphoric acid—total	21·55	21·27
“ soluble in one per cent citric acid solution	20·55	21·18
“ soluble in water	1·53	trace.
Potash—total	27·10	21·66
“ soluble in one per cent citric acid soluble....	19·94	17·45
“ soluble in water	8·67	1·54

Since, as has been shown by Dr. Bernard Dyer (*Journal of Chemical Society*, March, 1894), the average acidity of root-sap may be represented by a one per cent solution of citric acid, we may suppose that the amounts of phosphoric acid and potash dissolved out of these fertilizers by this solvent, indicate the quantities that are more or less immediately available for crop use. The above data show that by far the larger portion of phosphoric acid and potash present has been converted by this process into more valuable, because more readily available forms.

GROUND MINERAL PHOSPHATE AS A FERTILIZER.

The finely ground mineral phosphate (apatite), according to experiments made in our laboratory at Ottawa, is but very slightly soluble in one per cent citric acid solution. Thus, my results, obtained when using such a solvent in the proportion of one part of phosphate to 100 of the solution, showed that when treating a finely ground

phosphate containing approximately 25 per cent of carbonate of lime, only 6.2 per cent of the total phosphoric acid was rendered soluble. In other words, 1.5 per cent, approximately, of phosphoric acid had passed into solution by this treatment. Science has, therefore, corroborated practice, in showing that the ground mineral phosphate cannot be regarded as an economical source of *available* phosphoric acid, though undoubtedly the fineness and specific hardness of the material largely determines its exact value in this respect.

CHEMICAL EXPERIMENTS TOWARDS RENDERING AVAILABLE THE PHOSPHORIC ACID OF MINERAL PHOSPHATE.

From these results it became apparent that a previous treatment of the mineral phosphate was desirable and, indeed, necessary, if it was to be applied with a view to immediate returns.

To this end various experiments have been made in the laboratory of the Central Farm since 1893 towards a means of cheaply and effectively converting the phosphoric acid of ground phosphate into soluble and available forms, by means of the sulphates and bisulphate, and carbonates of the alkali metals. The first report on these experiments is contained in the report of the Minister of Agriculture for 1893. It is there shown that the fusion of one part of finely ground phosphate with the bisulphate of soda renders soluble a large proportion of phosphoric acid. Thus, in one instance, phosphoric acid equivalent to 38.49 per cent of apatite had been so converted. I may be allowed to quote from that report my conclusions as to the solubility of the phosphoric acid after ignition with the sulphates and bisulphates of soda and potash:—"I infer from these results (1) that any soluble phosphoric acid that may be formed during the ignition of the mineral phosphates with the sulphate of soda and potash, immediately recombines in the presence of water to form tricalcic phosphate, and (2) that the ignition of the mineral phosphates with the bisulphates of soda and potash produces, according to circumstances, more or less soluble phosphoric acid.

"This latter conclusion is a very important one, since it is possible that by using the by-product, sodium bisulphate, an economical method for the treatment of mineral phosphates may be devised. It is scarcely necessary to add that such a process would prove of great value to Canada and Canadian agriculturists. Before an affirmative statement can be made regarding the commercial success of such a method for converting and utilizing our phosphate, the cost of the raw materials and of the treatment, as well as the price obtainable for the manufactured article, must be taken into careful consideration."

Since 1893, further work had been done, the details of which have not yet been published. These latter experiments comprise the following:—(A) Heating together finely ground phosphate and sulphate of soda and treating the residue with 2 per cent citric acid solution. The results showed that phosphoric acid equivalent to 35 per cent to 37 per cent of the phosphate had been dissolved.

(B) Ignition of the finely ground phosphate with sodium bisulphate and treatment of the mass with 2 per cent citric acid solution. In this case 50 per cent of the apatite was found to have been rendered soluble in the acid solution.

The by-product that was used in these experiments contained only a small proportion of bisulphate, the larger part being sulphate of soda. It did not yield, therefore, as large an amount of soluble phosphoric acid as when pure bisulphate was used.

These experiments, the results of which I have condensed, were made before the appearance of Dr. Dyer's paper before referred to. Consequently, I was not then aware that 1 per cent citric acid represented the acidity in root sap. My solvent was undoubtedly too strong to give results which would allow us to say that the percentages of phosphate above stated are such as are rendered immediately available for plant use. Nevertheless, we may safely draw the conclusion that ignition of the finely ground phosphate with sulphate of soda, as well as the by-product, bisulphate of soda, does convert a considerable amount of phosphate into a form much more readily available than the phosphoric acid in the untreated material.

I intend to repeat these experiments, using 1 per cent citric acid solution for the treatment of the ignited mass.

(C) The third series of experiments in this investigation conducted by us, affords data regarding the effect of igniting finely ground phosphate with (1) wood ashes and (2) carbonate of potash. A mixture of wood ashes and finely ground phosphate was heated together and the mass subsequently treated with water. In the aqueous extract, phosphoric acid equivalent to 1.25 per cent of the phosphate was found. The residue, after treatment with water, was left over night in a 1 per cent solution of citric acid; this brought into solution phosphoric acid equivalent to 3 per cent of the phosphate. As the duplicate experiment in this trial closely agreed, we must infer that simple heating with wood ashes does not appreciably improve the solubility of the phosphoric acid in the mineral phosphate.

In the next experiment sand was added to the wood ashes and ground phosphate before ignition. This method was not found to increase the percentage of available phosphoric acid over that found in the preceding experiment.

Trials were then made by fusing together carbonate of potash and finely ground phosphate. Treatment of the mass with water dissolved phosphoric acid equivalent to 6.5 per cent of the phosphate, and the subjection of the residue to the action in the cold of 1 per cent citric acid further dissolved phosphoric acid corresponding to 43.00 per cent of the phosphate.

From these experiments, I conclude that ignition with wood ashes does not materially increase the availability of the phosphoric acid in apatite, but that ignition with carbonate of potash does so very materially. If commercially any of the processes that comprise heating ground phosphate with the sulphates and bisulphates or carbonates of soda or potash are practicable, undoubtedly we have a means of readily rendering more or less immediately available much phosphoric acid now locked up and well-nigh useless to agriculture.

I may point out that if the potash salt were used in the fusion, the resulting fertilizer would contain in addition to the available phosphoric acid, another element of almost equal importance to farm crops, viz., potash.

SUPERPHOSPHATE.

Superphosphate is the result of treating mineral phosphate or bones with sulphuric acid. The process converts the insoluble phosphoric acid into soluble and available forms. In commercial samples we find phosphoric acid in three forms, (a) phosphoric acid soluble in water, (b) "reverted" phosphoric acid, soluble in dilute citric acid solution, and (c) insoluble phosphoric acid. The value of any particular brand depends on the percentages present of the two first named. Reverted phosphate of lime is due to the formation of a compound intermediate between insoluble tricalcic phosphate and the water-soluble mono-calcic phosphate. Superphosphate is apt to revert in the soil or simply by keeping, the percentage of reverted phosphoric acid reducing that of the water-soluble phosphoric acid. This reversion may be caused by the action of the water-soluble phosphate on the insoluble phosphate present, as takes place on keeping or by the presence of lime, iron or alumina in the soil.

When reversion is caused in the soil by excess of lime, the deterioration in value, from an agricultural standpoint, is not nearly as serious as when caused by iron or alumina. The value of reverted phosphoric acid is a question of great dispute. Reverted phosphate is of vastly greater value than the insoluble tricalcic, but does not appear to be quite equal to that of the water soluble (monocalcic) phosphate.

Superphosphate has been found the very best source of phosphoric acid for crops whose early growth must be hastened and for those whose season of growth is not an extended one. Thus, in the case of turnips, its application may advance the growth of the crop to such an extent that the plants are able to successfully resist the ravages of the turnip fly. For cereals, and especially barley, in conjunction with nitrogenous manures, it is especially valuable. In a fertilizer for pastures, potatoes, mangels and other root crops it is also a most useful ingredient.

Available phosphoric acid in the soil has the tendency to bring about early maturity of the crops. As the season of growth advances, the phosphoric acid migrates, accumulating in the seed. It is thus that the soil is particularly impoverished in this constituent when the custom of growing large areas of grain and selling their product off the farm is persisted in.

APPLICATION OF SUPERPHOSPHATE.

With regard to the rate of application of superphosphate, no definite amounts can be stated as being the most economical for all crops and all soils. As a special fertilizer for fruit trees and orchards, it must be supplemented by some form of potash in addition to nitrogen. Roots also require liberal quantities of phosphoric acid ; for cereals superphosphate gives the best returns when applied with available nitrogenous manure.

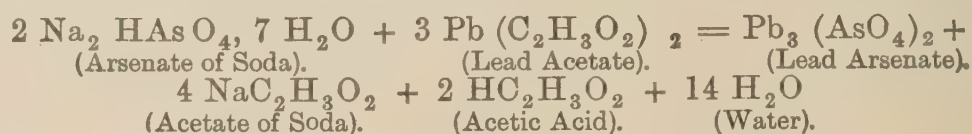
With barn-yard manure, 100 to 300 pounds of superphosphate per acre will be probably the quantity most profitable to use. For special and intense farming, 300 to 500 pounds per acre may be applied, together with a nitrogenous or potash fertilizer, as the case may require. As plant food in different soils varies so much in amount, and as plant requirements also vary greatly, it is impossible to lay down any hard and fast lines for universal guidance. Any excess of phosphoric acid applied, however, is not likely to be lost, for it is not, like nitrogen, easily leached from the soil. All farm crops require phosphoric acid, and there are but few of our cultivated soils in the older provinces of Canada that would not have their crop yields increased by an application of phosphoric acid in an easily available form.

MISCELLANEOUS INVESTIGATIONS.

ARSENATE OF LEAD, A NEW INSECTICIDE.

This substance has been recommended as a substitute for Paris green in spraying mixtures used for the destruction of "biting" insects, such as the apple worm (Codling Moth) and the Plum Curculio. Being insoluble in water, and reported as non-injurious to foliage, it is held that it may with safety be employed in larger amounts than those given in the formulæ containing Paris green; at the same time it is said that this compound is equally as efficacious in the extermination of insect foes as the latter well known and widely used insecticide.

Since many erroneous and misleading formulæ have appeared in print for its preparation, it has been thought advisable to ascertain the exact chemical nature of the compound used and to deduce therefrom the correct weight of the materials to employ, corroborating the latter by actual experiment. It is probable that some of the apparent discrepancies in the published formulæ have been due to the employment of crude and impure arsenate of soda, such as is used in calico-printing. The chemicals used are acetate of lead and arsenate of soda, the result of the reaction on mixing solutions of these being the formation of an insoluble precipitate of lead arsenate, acetate of soda remaining in solution. Lead arsenate so formed is a white amorphous compound, settling to the bottom of the vessel, on standing. The reaction when using pure reagents is represented by the following equation:—



DIRECTIONS FOR PREPARING THE INSECTICIDE.

To prepare fifty gallons of the mixture at the rate of one pound of lead arsenate to two hundred gallons of water: dissolve three ounces of arsenate of soda in a quart or so of water (it dissolves readily in cold water). Dissolve four and three-quarter ounces of lead acetate in a similar volume of water. Pour both solutions into a barrel already containing about forty-five gallons of water and stir well. The volume may now be made up to fifty gallons. This formula provides for the presence of a slight excess of lead acetate in solution: if the arsenate of soda were in excess, injury would probably result to the foliage.

The lead arsenate remains longer in suspension when precipitated in a large volume of water than when made concentrated and subsequently diluted.

On filtering off a little of the liquid and adding to it a few drops of the arsenate of soda solution (which is reserved for this purpose), a white precipitate should form, showing excess of lead.

It should be remembered that arsenate of soda and acetate of lead, as well as the product, are poisonous.

Respecting the price of the material, I could not obtain any Canadian quotations for commercial arsenate of soda; the pure article costs about \$2 per pound. Acetate of lead retails at 25 cents per pound or in quantities of five pounds or more at 15 cents per pound. At these prices, the cost of the material for 50 gallons of the insecticide (strength as above) would be about 42 cents.

WELL WATERS ON FARM HOMESTEADS.

We here present in tabular form the analytical data of 65 samples of well waters from Canadian farms examined during the past year. In each instance a full report has been sent to the forwarder of the sample. In many cases we have been obliged to advise the immediate discontinuance of the use of the water for household purposes, for it will be seen from the brief remarks given in the last column of the table that a large proportion of the samples proved on analysis to be seriously polluted.

The importance of pure and unpolluted water to the health of man and animals, and the danger that exists in water contaminated with drainage we have emphasized in previous reports and at the chief agricultural conventions. It is now well known that many infectious diseases are conveyed through an impure water supply, and, further, that thrift in the farm cattle and first class, wholesome dairy products are largely dependent upon a plentiful supply of good water. The value of this branch of our work, therefore, is obvious, since without an analysis it is usually very difficult to judge of the purity of water.

A word of caution may be given to those about to sink wells. Information received from those forwarding samples shows that many farmers' wells are in the stable or barn-yard or at best dangerously near the privy or other polluting source. The result of this convenient (?) method is that too often an infiltration of drainage into the well has taken place; indeed, in many instances the well has been found to be a veritable cess-pit containing a fluid much better for watering a hot-bed than for use as a beverage. We would, therefore, strongly advise sinking the well at a safe distance from such sources of contamination, and, further, a careful examination from time to time of the well and its environment. It must be remembered that in light sandy soils, drainage will travel long distances and if opportunity presents itself will find its way into the well, which naturally offers a lower level in its passage through the soil.

Farmers desiring to avail themselves of the privileges of water examination at the laboratories of the Central Farm are asked to write for instructions for the collection and shipment of samples. In very many instances, owing to the small quantity sent, or the water being contained in dirty bottles, it has been impossible to make an analysis upon which a report as to the quality of the sample could be based.

ANALYSES OF

RESULTS STATED

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.
			1894.					
1	Athens, Ont.....	W. J. G.....	Nov. 2..	0·036	0·045	0·034	3·75	278·0
2	Almonte, Ont.....	D. M. F. No. 1.	Dec. 7..	trace.	0·132	3·006	28·0	444·8
3	"	D. M. F. No. 2.	" 7..	0·89	0·068	1·062	2·5	352·2
4	Vernon, B.C.....	L. N. No. 1.....	" 18..	0·03	0·06	0·038	1·6	449·2
5	"	L. N. No. 2.....		0·02	0·062	0·041	3·0	429·6
6	"	L. N. No. 3.....		0·01	0·073	0·025	2·6	492·0
7	"	L. N. No. 4.....		trace.	0·024	0·026	1·0	269·2
8	"	L. N. No. 5.....		trace.	0·035	0·1150	0·8	366·4
9	"	L. N. No. 6.....		0·044	0·12		0·8	
10	Cowansville, Que.....	A. McF.....	Dec. 26..	0·004	0·111	2·344	6·8	160·8
			1895.					
11	Bradford, Ont.....	R. T. per W. C.....	Feb. 2..	0·09	0·37	3·566	60·0	664·0
12	Hamilton, Ont.....	W. G. W. No. 3.....	" 13..	0·27	0·335	0·1894	0·5	
13	"	W. G. W. No. 4.....	....	0·20	0·190	0·1071	0·4	
14	"	W. G. W. No. 5.....		0·22	0·225	0·160	trace.	
15	Newstadt, Ont.....	L. K.....	Feb. 13..	1·632	0·108	0·023	1350·0	4888·0
16	Shakespeare, Ont.....	J. W. D.....	" 23..	trace.	0·15	11·51	130·0	698·0
17	Lansdown, Ont.....	J. D.....	" 25..	0·638	0·96	0·084	96·0	362·0
18	Thornbury, Ont.....	G. F. M. No. 1.....	" 25..	0·35	1·156	0·025	4·3	266·0
19	"	G. F. M. No. 2.....		0·008	0·48	10·966	316·0	1166·0
20	East Templeton, Que....	F. C.....	Mar. 8..	0·032	0·17	2·98	7·0	262·4
21	Bonnechère River, Renfrew, Ont.....	J. K. R.....	" 25..	0·034	0·325	0·169	4·0	129·6
22	Bonnechère River, Renfrew, Ont.....	J. K. R.....	" 25..	0·09	0·325	0·0576	6·6	134·0
23	Hurd's Lake, Renfrew, Ont.....	J. K. R.....	" 25..	0·10	0·547	0·125	2·0	86·0
24	Cowansville, Que.....	A. McF.....	" 26..	0·017	0·097	1·995	9·0	160·0
25	Miami, Man.....	W. R.....	April 25..	0·041	0·980	0·093	30·0	9276·0
26	Regina, N.W.T.....	C. G.....	" 25..	0·45	0·715	0·04	2·10	47·6
27	Ladner's Landing, B.C.....	H. N. R. (B.).....	May 7..	0·16	0·42	0·527	192·0	
28	"	H. N. R. (G. A.).....		1·235	0·475	?	22·0	
29	"	H. N. R. (J. P.).....		1·312	0·175	?	20·0	
30	Qu'Appelle, N.W.T.....	H. M. P.....	June 14..	0·569	0·31	0·09	10·8	
31	"	S. C. B.....	" 14..	0·214	0·812	0·04	11·0	
32	Beachburg, Ont.....	J. B.....	July 2..	0·256	0·14	0·108	16·0	369·0
33	Plevna, Ont.....	A. M. W.....	" 4..	15·75	2·73		84·0	
34	Outremont, Que.....	H. L. B.....	June 26..	none.	0·05	1·56	2·35	226·3
35	Forrester's Falls, Ont...	A. W. R.....	July 6..	3·614	0·26	none.	332·0	6246·0
36	Almonte, Ont.....	E. P. W.....	" 31..	0·046	0·101	3·27	30·0	436·8
37	"	D. M. F.....	" 31..	1·67	0·256	0·074	1·6	
38	Paris Station, Ont.....	J. H. W.....	Aug. 22..	0·06	0·078	2·355	3·8	306·8
39	Regina, N.W.T.....	N. W. M. P.....	" 30..	0·63	1·12	none.	14·0	588·0
40	"	N. W. M. P.....	" 30..	0·33	1·14	none.	14·0	596·0
41	Waterville, N.S.....	J. A. G. C.....	Sept. 4..	0·044	0·34	5·035	70·0	324·0
42	Winona, Ont.....	M. P.....	" 7..	0·01	0·24	5·130	95·0	4137·2
43	Orillia Ont.....	R. A. L. No. 1.....	" 10..	0·02	0·06		2·0	
44	"	R. A. L. No. 2.....	" 10..	0·08	0·16		5·5	
45	Grenfell, N.W.T.....	L. H. H.....	" 10..	0·436	0·70		160·0	
46	Vernon, B.C.....	W. & B.....	" 23..	0·02	0·084	0·05	3·0	428·0
47	Renfrew, Ont.....	J. K. R. No. 1.....	" 25..	0·16	0·05	5·015	105·0	701·2
48	"	J. K. R. No. 2.....	" 25..	0·02	0·024	3·805	42·5	558·0
49	"	J. K. R. No. 3.....	" 25..	0·066	0·03	5·315	13·0	493·6
50	"	J. K. R. No. 4.....	" 25..	none.	0·175	13·654	330·0	1672·4
51	Sherbrooke, Que.....	W. P. R.....	" 27..	trace.	0·05	0·132	1·20	212·0
52	Milton, Ont.....	J. S.....	Oct. 5..	trace.	0·06	0·085	2·70	320·0
53	Merton, Ont.....	W. G. W. (T. S.) No. 6...	" 5..	0·3	0·02	1·879	26·5	337·0
54	"	W. G. W. (J. A. R) No. 7.	" 5..	0·008	0·01	1·377	15·0	310·4
55	"	W. G. W. (J. M.) No. 8..	" 5..	0·63	0·13	1·31	29·0	492·0
56	Bronte.....	W. G. W. (E. M. W.) No. 9	" 5..	0·01	0·004	1·415	20·0	325·2
57	Utterson, Ont.....	D. B. No. 1.....	" 7..	trace.	0·10	1·72	6·0	

WELL WATERS, 1895.

IN PARTS PER MILLION.

Solids after Ignition.	Loss on Ignition.	Oxygen absorbed at 80° F.		Phosphates.	Report.
		In 15'	In 4 hours.		
228.0	50.0	.1080	.2376	.....	A good water.
263.2	181.6	.504	1.0188	traces.....	Contaminated.
235.2	117.0	.2252	.5040	".....	Evidently seriously polluted.
316.8	132.4	.428	.948	".....	From small stream ; good water.
345.6	84.0	.948	1.916	".....	From spring
428.0	64.0	.852	1.704	".....	From small stream
246.6	22.6	.252	.524	".....	"
322.4	44.0	.216	.464	none.....	Spring water
118.8	42.0	.520	1.072	slight traces.....	insufficient data for report. Must be regarded as suspicious.
432.0	232.0	.900	2.156	heavy traces.....	Seriously contaminated, not safe to drink.
.....	.....	.....	.....	slight traces.....	Sample of ice from Burlington Bay ; impure.
.....	".....	"
.....	".....	"
3764.0	1124.0	.....	.....	traces.....	Very impure, condemned for drinking purposes.
464.0	234.0	.332	.772	".....	Previously polluted, not a safe water.
202.0	160.0	.....	.....	heavy traces.....	Receives contaminating drainage water.
160.0	106.0	.....	.....	traces.....	Condemned.
806.0	360.0	.....	.....	".....	very bad water.
162.4	100.0	.388	.828	heavy traces.....	Not first class, must be regarded as suspicious.
69.6	60.	2.26	4.268	".....	Below Smith's Creek ; a fair water.
72.0	62.0	2.516	4.804	traces.....	Above " suspicious, indicates pollution.
36.0	50.0	2.248	4.700	slight traces.....	Six miles from Renfrew. " "
98.0	62.0	.372	.572	heavy traces.....	Highly suspicious. [character.]
7736.8	1539.2	.....	.....	.....	Contains a large amount of saline matter of a purgative
9.2	38.4	1.844	3.429	.....	Probably polluted, not a safe water.
.....	.....	.....	.....	.....	Condemned for use.
.....	.....	.....	.....	.....	" very seriously polluted.
.....	"
.....	.....	.....	.....	.....	Seriously contaminated with organic filth.
.....	.....	.....	.....	.....	Polluted with drainage.
240.0	129.0	.....	.....	.....	Unfit for drinking purposes, contaminated.
.....	.....	.....	.....	.....	A very bad water, very dangerous to use.
194.8	31.5	.064	.440	.....	Probably a safe water.
5726.8	520.0	.....	.....	traces.....	Evidently receives drainage of a pernicious character
326.0	110.8	.356	.512	heavy traces.....	Viewed with grave suspicion.
.....	.....	.544	1.296	.....	A very dangerous water, extremely impure.
250.8	56.0	.704	1.292	.....	Not condemned, but highly suspicious.
425.6	162.4	4.456	7.608	trace.....	Not fit for drinking purposes, polluted.
425.2	170.8	4.096	7.548	heavy traces.....	"
266.4	57.6	.....	.....	traces.....	Nitrates too high, a highly dangerous water.
3199.8	937.4	.7732	1.6652	slight traces.....	Unsafe for household purposes.
.....	.....	.....	.....	.....	Upper stream, a really first-class water.
.....	.....	.....	.....	.....	Lower stream, inferior in quality to No. 1.
.....	.....	.....	.....	.....	Very impure, dangerous to use.
370.0	58.0	.3504	.7424	very slight traces..	A good water, unpolluted and wholesome.
537.2	164.0	.724	1.156	slight traces.....	Private well, not a good water.
478.0	80.0	.412	.620	none.....	Public " polluted.
408.0	85.6	.422	.580	traces.....	Convent " "
1170.6	501.8	.928	1.816	heavy traces.....	Well in stable yard, a very bad water.
188.0	24.0	.....	.....	very slight traces..	A good wholesome water, no pollution.
257.6	62.4	.....	.....	traces.....	A safe and wholesome water.
235.0	102.0	.....	.....	".....	Previous contamination, not a first-class water.
240.4	70.0	.....	.....	heavy traces.....	"
440.4	52.0	.....	.....	".....	A very bad water, seriously polluted.
283.3	42.0	.....	.....	traces.....	Shows previous contamination.
.....	.....	.....	.....	.....	Polluted.

ANALYSES OF
RESULTS STATED

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.
58	Utterson, Ont.....	D. B. No. 2.....	Oct. 7..	trace.	0·028	trace.	trace.	.....
59	Inverary, Ont.	A. R.....	" 11..	7·708	0·40	0·817	750·0	684·4
60	Milverton, Ont.....	R. R.....	" 14..	0·072	0·07	1·96	120·0	609·4
61	N. Easthorpe.....	P. L. (Dr. W.).....	" 17..	none.	0·066	1·515	2·0	304·0
62	"	J. B. (Dr. W.).....	" 17..	0·435	0·12	1·64	10·4	330·8
63	Ancaster, Ont	W. G. W. (R.E.G.) No. 10	" 29..	free.	0·056	2·513	6·0	.....
64	"	W. G. W. (J. P.) No. 11..	" 29..	0·026	0·112	2·054	70·0	.....
65	Dundas, Ont.....	W. G. W. (B. B.) No. 12 .	" 29..	free.	0·02	1·128	9·8	.....
66	Ancaster, Ont.....	W. G. W. (G.H.H.) No. 13	" 29..	0·15	0·028	2·426	10·4	.....
67	Almonte. Ont.	Mrs. P. D.....	" 31..	0·056	0·17	14·731	620·0	.....

WELL WATERS, 1895—*Concluded.*

IN PARTS PER MILLION.

Solids after Ignition.	Loss on Ignition.	Oxygen absorbed at 80° F.		Phosphates.	Report.
		In 15'	In 4 hours.		
354.4	330.0	.....	.....	traces	Pure and wholesome.
390.6	218.8	.....	.....	" .....	An exceedingly bad water, quite unfit for use.
257.6	46.4	.....	.....	.....	Must be regarded as seriously contaminated.
254.8	76.0	.....	.....	.....	Free from pollution.
.....	.....	.....	.....	.....	Pollution from drainage matter; dangerous.
.....	.....	.....	.....	.....	Indication of previous contamination.
.....	.....	.....	.....	.....	Polluted.
.....	.....	.....	.....	.....	Indication of previous contamination.
.....	.....	.....	.....	.....	Evidently seriously polluted.
.....	.....	.....	.....	.....	Very impure, seriously polluted.

CANADIAN CEREALS AT THE WORLD'S COLUMBIAN EXPOSITION.

At the instance of Sir Henry Trueman Wood, Secretary to the British Commission, and acting under instructions from the Honourable the Minister of Agriculture, the writer, in the autumn of 1893, went to Chicago as a professional juror to participate in the work of the analysis of the cereals entered for award at the World's Columbian Exposition.

The analysis of food products competing for awards was under the direction of Dr. Harvey W. Wiley, Chief Chemist of the Department of Agriculture, Washington, D. C., who, for the purpose of this extensive investigation, had a large and well equipped laboratory in the United States Government building on the grounds.

Owing to the limited time and the large number of samples sent in, it was found that the analyses could not be completed in Chicago. It was, therefore, deemed expedient to determine at that time the essential constituents and such as would prove useful in determining the food values of the grains submitted, leaving the other estimations to be made by Dr. Wiley's staff at the United States Government laboratories in Washington. Accordingly, Mr. T. S. Trescot (of the Department of Agriculture, Washington) and the writer determined the percentage of albuminoids, while others determined the moisture, ash and weight of 100 kernels. The other data were subsequently determined in Washington.

The results of this investigation have been collated and prepared for publication by Dr. Wiley, and issued in September, 1895, by the Department of Agriculture, Washington, as *Bulletin* No. 45 of the Division of Chemistry.

Besides serving the purpose of supplying data for making the awards, it was hoped that such an extensive investigation into the composition of American and foreign cereals would be of scientific value in affording information from which deductions might be made as to the effect of climate and soil on the grains. This latter object, however, has only in part been realized, since the samples submitted for analysis cannot be said in all cases to be typical of the States and Provinces from which they were collected. If strictly typical grains had been selected by an expert, there can be no doubt that the chemical results published in the bulletin referred to would have been of far greater and more lasting value.

The analytical data about to be presented are not, however, without interest, proving in many instances the high nutritive qualities of Canadian cereals, and showing beyond dispute that the soil and climate of Manitoba and the North-west Territories are particularly favourable to a wheat valuable alike as to its nutritive and milling properties.

WHEAT.

Of the 166 samples of wheat submitted to analysis, 49 samples were from Canada. Their composition in detail is given in the following table:—

Grower.	Variety.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbo-hydrates.	Wet gluten.	Dry gluten.
ONTARIO.										
Jos. Brethour, Burford....	Russian Spring	5·270	11·15	11·73	1·71	2·62	1·79	71·00	26·60	10·14
Henry Grout, Townsend..	Red Clawson	4·044	10·12	11·20	1·92	2·35	1·76	72·65	22·82	8·77
Andrew Turnbull, North Dumfries.	Surprise	5·335	10·58	8·23	2·04	2·12	1·67	75·36	19·53	2·80
J. E. Richardson, Burford	Golden Cross	4·857	11·11	9·80	1·77	2·17	1·88	73·27	20·86	8·10
Thos. Puzey, Woodhouse..	Red Manchester	4·687	10·46	9·98	1·96	2·40	1·93	73·28	22·91	8·72
Thomas Elmes, Burford...	White Winter	4·376	11·75	9·80	1·73	2·57	1·70	72·45	19·16	7·50
Robert Walker, Ancaster..	American Bronze	4·389	12·75	10·50	1·59	2·50	1·70	70·95	20·17	8·14
F. Lloyd Jones, Burford..	White Clawson Fall..	4·803	12·15	10·50	1·68	2·35	1·82	71·50	21·23	8·18
“	Rio Grande Spring..	3·276	12·27	11·38	1·99	2·77	2·00	69·59	22·25	9·14
John A. Smith, Charlotte- ville.	Golden Cross Fall...	4·100	10·87	9·80	1·83	2·21	1·87	73·42	21·85	4·99
James Brethour, Burford.	Wild Goose	4·655	12·17	13·48	2·32	2·17	1·93	67·93	32·56	13·09
Richard Wilson, Townsend	Surprise Winter.....	4·421	11·76	9·63	1·74	2·19	1·83	72·85	15·09	5·66
And. Clifford, St. Joseph Island.	Red Fern	3·567	11·15	10·50	2·20	2·50	1·72	71·93	22·84	9·18
J. T. Talman, Saltfleet...	Clawson white winter	4·743	11·64	9·28	1·76	2·12	1·66	73·54	18·54	7·08
John W. Clark, Saltfleet..	“	4·673	11·92	9·28	1·76	2·15	1·73	73·16	14·04	5·42
William Tuck, Nelson....	Zerewa White Winter	4·459	11·47	8·40	1·88	2·05	1·75	74·45	14·27	5·35
John C. Shaw, Woodburne	Surprise	4·107	11·95	8·58	1·85	2·05	1·60	73·97	6·38	2·29
D. Burt, St. George	Red Clawson	4·981	10·00	11·64	1·98	2·12	1·84	72·42	23·91	9·56
W. Pennock, South Crosby	McCarling	5·144	12·10	12·43	2·06	2·30	1·96	69·15	25·21	10·08
Major Walker, Ancaster..	American Bronze...	4·198	11·95	9·45	1·89	2·10	1·81	72·80	18·12	6·85
T. Manderson, Reach....	White Fife	4·429	11·24	12·95	2·08	2·20	1·76	69·77	27·37	11·20
J. E. Richardson, Prince- ton	Spring	3·827	13·98	9·45	0·41	2·12	1·60	72·44	19·84	6·62
T. Manderson, Reach....	Standard White.....	4·294	13·80	9·11	1·79	2·25	1·56	71·49	18·67	7·54
Wm. Tuck, Watertown....	Zerewa White	4·478	12·65	8·58	1·82	2·12	1·75	73·08	12·34	4·79
Wm. Pennock, South Crosby	White Fife Spring ..	3·899	11·36	13·48	1·96	2·30	1·82	69·28	26·97	10·83
J. S. Pearce, London, Ont	White Russian Spring	3·891	11·29	14·18	1·45	2·32	1·72	69·04	27·91	10·88
MANITOBA.										
Government of Manitoba, Winnipeg	Red Fife	3·452	10·56	15·05	1·99	3·12	1·45	67·83	33·28	13·47
W. Sandy, Thornhill.....	White Fife	3·450	11·98	13·91	1·79	2·40	1·48	68·44	20·77	8·00
W. A. Kilkenney, Broom- hill	Red Fife	3·389	12·08	15·05	1·60	2·10	1·38	67·79	28·11	11·43
W. J. Benny, Eden	“	3·376	11·93	15·40	1·86	2·37	1·41	67·03	28·24	11·69
E. & A. Melon, Portage la Prairie	“	3·113	12·73	13·30	1·92	2·42	1·54	68·09	32·32	13·24
W. Foxwell, Brandon....	“	3·412	12·17	14·70	1·88	2·10	1·44	67·71	24·03	9·83
R. H. Honeyman, Eden..	“	3·242	12·23	14·97	1·85	2·35	1·61	66·99	30·25	12·30
Wm. Hope, Carberry....	“	3·259	12·10	14·70	1·82	2·25	1·44	67·69	29·35	12·05
M. Morrison, Griswold...	White Fife	3·380	12·05	14·53	1·89	1·75	1·50	68·28	30·37	12·60
NORTH-WEST TERRITORIES.										
N. W. T. Govt., Regina..	Hard Red Fife ...	4·105	11·30	15·84	1·86	2·00	1·74	67·26	37·11	14·40
“ ..	White Fife	3·791	11·50	15·05	1·66	2·07	1·50	67·22	35·87	13·86
“ ..	Wheat in Straw.....	4·181	12·30	11·90	1·99	2·25	1·80	69·76	22·83	9·13
A. N. Morden, Pincher Creek	“	3·672	10·07	16·10	1·92	2·00	1·47	68·44	38·94	15·24
N. W. T. Govt., Regina..	Ladoga	3·362	9·38	13·30	1·97	2·17	1·42	71·76	29·11	11·45
“ ..	White Fife	3·976	11·09	15·23	1·91	2·00	1·51	68·26	32·75	13·39
“ ..	“	4·085	12·91	15·58	1·51	2·15	1·93	65·92	24·54	10·09
“ ..	Red Fife	3·951	12·90	13·48	1·70	2·37	1·63	67·92	33·13	13·15
“ ..	“	3·447	12·53	14·44	1·70	2·27	1·63	67·43	27·20	11·30

WHEAT—Continued.

Grower.	Variety.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbo-hydrates.	Wet gluten.	Dry gluten.
BRITISH COLUMBIA.										
Price Ellison, Vernon.....	Colorado Spring Wheat.....	4·411	11·47	12·08	1·87	2·60	1·88	70·19	31·87	12·18
D. G. Gummongs, Spalum- cheen.....	Cambell's White Chaff Spring.....	4·100	11·50	12·08	1·69	2·50	1·87	70·36	29·75	11·25
D. Matherson, Spalum- cheen.....	Red Fife.....	4·052	10·77	13·65	2·27	2·10	1·86	69·35	31·99	12·76
Earl of Aberbeen, Spalum- cheen.....	Cambell's White Chaff Spring.....	4·197	12·03	11·73	1·70	2·00	1·88	70·66	27·29	10·40
W. H. Ladner, Ladners..	Ladoga.....	4·118	11·63	15·23	1·77	2·05	1·72	67·60	30·59	12·17
Means....	.....	4·052	11·69	12·25	1·80	2·26	1·69	70·31	25·13	9·76

In order that the wheats from the different provinces exhibiting may be easily compared, the subjoined table has been compiled.

CANADIAN WHEAT AVERAGES.

Provinces.	Number of Samples.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbo-hydrates.	Wet gluten.	Dry gluten.
Ontario.....	26	4·419	11·75	10·51	1·81	2·27	1·39	72·27	20·82	7·80
Manitoba.....	9	3·341	11·98	14·62	1·84	2·32	1·47	67·77	28·52	11·62
North-west Territories.....	9	3·841	11·55	14·53	1·80	2·14	1·63	68·35	31·27	12·44
British Columbia.....	5	4·175	11·48	12·95	1·86	2·25	1·02	70·44	30·30	11·75

In *Bulletin* No. 4 of the Experimental Farm series and in other of our publications, information has been given at length respecting the several constituents, the names of which appear on the tables here presented. It will, therefore, suffice now to point out that the food element of chief value is included under the term "albuminoids," which represents the nitrogenous or flesh-forming portion of the grain, referring the reader to the publications of the farm mentioned above, for fuller information on this subject.

In order to arrive at the comparative food values of the grains analysed, it was assumed that the albuminoids and fats were two and a half times as valuable as the carbo-hydrates. The data supplied to the jury of awards, therefore, were obtained by multiplying the percentages of albuminoids and fats by 2·5 and the percentage of carbo-hydrates by one and adding the products together.

It has been remarked by Richardson (*Bulletins* Nos. 1, 3, 9, Chemical Division, United States Department Agriculture) and others that wheat, of all cereals, is most susceptible to environment. We also pointed out the marked effect of climate upon the quality of wheat as grown in various parts of Canada, in the *Bulletin* No. 4 on Ladoga wheat, already referred to.

It will not, therefore, appear strange to those who have any knowledge of the subject that the best Canadian wheats exhibited were those grown in Manitoba and the North-west Territories. The percentages of albuminoids in these wheats are considerably higher on the whole than in those grown in other parts of Canada, and it is very evident from the analytical data here given, as well as those furnished in former reports, that the popular impression regarding the very excellent qualities of wheat from these provinces receives a further and most emphatic corroboration.

WHEAT AVERAGES.

That Canadian readers may have the opportunity of comparing foreign grown wheats with those grown in the Dominion, the annexed table has been given:—

State.	No. of Samples.	Weight of 100 Kernels.	Moisture.	Albuminoids.	Ether Extract.	Crude Fibre.	Ash.	Carbohydrates.	Wet Gluten.	Dry Gluten.
New York	8	4·057	10·38	12·34	1·92	2·07	1·67	71·63	27·36	9·69
Oregon.....	11	4·579	11·53	9·19	1·72	2·25	1·69	73·61	16·74	6·41
Bulgarian.....	1	4·696	12·40	11·55	1·52	1·95	1·67	70·91	29·10	7·97
South Dakota.....	8	3·337	9·02	14·89	2·04	2·49	1·70	69·89	30·25	13·71
Nebraska.....	5	2·973	10·31	13·86	1·91	2·83	1·93	71·16	32·57	12·36
Montana.....	2	2·858	11·12	13·21	2·23	2·48	1·99	68·95	28·35	11·41
Pennsylvania.....	12	3·900	11·08	12·98	1·84	2·45	1·91	69·73	29·57	11·41
Michigan.....	6	3·896	10·64	11·43	1·78	2·31	1·85	71·98	23·51	9·17
Ohio.....	3	4·136	10·34	11·08	1·85	2·17	1·85	72·71	22·06	8·79
Maine.....	1	3·532	9·45	13·13	1·85	2·25	1·90	71·42	30·90	11·95
Australian.....	4	5·468	11·54	9·10	1·55	2·04	1·82	73·94	20·64	7·88
Iowa.....	1	3·874	11·90	16·01	1·77	2·20	1·45	66·67	33·44	13·80
Colorado.....	5	4·302	9·46	13·65	1·94	2·74	1·92	70·28	30·26	11·66
Wisconsin.....	16	3·519	10·73	12·85	1·77	2·25	1·81	70·58	28·00	11·13
Wyoming.....	7	4·290	11·44	12·43	1·91	2·24	1·86	70·34	28·54	10·87
Kentucky.....	4	3·769	11·42	13·17	1·71	2·41	1·74	69·55	26·68	10·59
Indiana.....	8	3·680	11·18	12·05	1·71	2·42	1·82	70·81	25·92	10·04
West Virginia.....	5	3·716	10·90	13·30	1·83	2·20	1·85	69·92	30·02	11·75
Missouri.....	1	3·844	11·50	12·25	1·75	2·10	1·94	70·46	29·13	11·33
Washington.....	11	4·787	10·46	10·66	1·67	2·31	1·83	73·08	23·20	8·59
Argentine Republic.....	5	3·112	9·55	12·78	1·84	2·69	1·99	71·15	28·83	11·58
Illinois.....	22	4·255	10·59	11·76	1·69	2·39	1·80	71·77	24·40	9·69
Costa Rica.....	2	3·298	10·74	12·12	1·69	2·44	1·78	71·23	26·31	10·44
Spanish.....	1	5·446	10·50	12·60	1·80	2·42	2·01	70·67	32·57	12·33
Kansas.....	28	3·417	10·21	12·15	1·64	2·41	1·90	71·68	27·51	10·46
Canadian.....	49	4·090	11·69	12·25	1·80	2·26	1·69	70·31	25·13	9·76
North Carolina.....	2	4·476	12·32	11·42	1·70	2·35	1·80	70·40	24·16	9·41

OATS.

Twelve samples of Canadian oats were examined. Since oats find their chief market as horse feed, the hulls were ground with the kernel before analysis, and this fact accounts for the apparently high percentages of fibre and ash found in the samples.

Canada.	Weight of 100 kernels.	Moisture.	Albumi- noids.	Ether extract.	Crude fibre.	Ash.	Carbo- hydrates.
Ontario Agricultural College, Guelph, Ont.	3·871	9·27	11·73	4·09	13·48	2·95	58·48
I. E. Richardson, Blenheim	3·390	9·43	11·47	4·36	13·00	2·86	58·88
Gaylord Greenman, Charlotteville	2·791	9·21	11·73	5·56	8·60	2·92	61·98
I. E. Richardson, Blenheim	3·750	9·20	10·68	4·29	13·89	3·29	58·65
Richard P. Wilson, Trafalgar.	3·076	9·87	11·55	5·49	8·52	3·22	61·35
George Baker, Woodhouse	3·278	8·83	11·38	3·93	14·25	3·16	58·45
A. G. Meisner, Gainesborough, Ont.	2·912	8·55	12·08	4·07	13·36	2·99	59·04
George Baker, Woodhouse.	3·092	8·52	11·20	3·79	15·65	3·23	57·61
George Padget, Markham, Ont.	4·253	9·21	12·25	4·90	11·62	2·71	59·31
D. Alton, McDonald.	3·698	10·16	12·78	4·27	12·27	2·87	57·65
I. Wilson, Fergus ¹ Ont. ....	.....	9·65	14·18	6·63	1·12	1·94	66·48
W. Wanman, Souris, Man.	2·895	11·63	11·03	4·96	11·00	2·97	58·41
Means.	3·364	9·46	11·83	4·73	11·39	2·92	59·69

We may note several points in favour of Canadian oats. These are: (1) A heavy kernel; (2) a low percentage of moisture; (3) high albuminoids; (4) a large percentage of fat. These facts will be apparent on examining the following averages, taken from Dr. Wiley's bulletin on World's Fair cereals:—

From.	No. of Samples.	Weight of 100 kernels.	Moisture.	Albumi- noids.	Ether extract.	Crude fibre.	Ash.	Carbo- hydrates.
Colorado	2	3·024	8·12	12·26	4·23	13·96	4·09	57·34
Illinois.	10	2·684	9·59	11·69	3·39	12·82	3·47	58·54
Indiana.	5	2·672	9·24	12·71	4·06	14·05	3·15	56·79
Iowa.	1	3·255	8·30	10·68	4·44	15·23	3·81	57·54
Kansas.	11	2·920	10·19	12·55	5·12	10·01	3·72	58·40
Kentucky.	4	2·254	9·85	12·06	4·35	12·35	3·60	57·78
Michigan.	5	3·176	11·43	12·95	4·14	12·25	2·90	56·36
Ohio.	2	2·409	9·52	12·95	4·13	13·00	3·15	57·26
Pennsylvania.	6	2·589	10·16	12·46	3·92	12·68	3·04	57·73
Wisconsin.	1	2·843	11·65	10·68	4·27	11·17	3·15	59·08
Wyoming.	8	3·248	10·82	11·26	4·91	10·33	3·92	58·75
Canada.	12	3·364	9·46	11·83	4·73	11·39	2·92	59·69
Great Britain.	1	3·242	10·29	10·68	6·21	9·40	2·75	60·67
Total mean, foreign oats. ....	.....	3·354	9·52	11·75	4·84	11·24	2·91	59·76
Total mean, all oats. ....	.....	2·995	9·96	12·07	4·42	11·92	3·35	58·28

BARLEY.

Of the 55 samples of barley analysed, 20 samples were Canadian grown. Their composition is tabulated as follows:—

	Weight of 100 kernels.	Moist- ure.	Albu- minoids	Ether extract.	Crude fibre.	Ash.	Carbo- hydrates
CANADA.							
Ontario Agricultural College, Guelph, Ont.	4.300	9.15	11.03	2.17	4.07	2.55	71.03
“ “ “ “ “ “	3.856	11.52	10.59	2.24	5.00	2.66	67.99
“ “ “ “ “ “	3.882	10.75	9.89	2.25	4.35	2.68	70.08
“ “ “ “ “ “	5.368	10.68	10.68	2.22	4.35	2.56	69.51
Richard P. Wilson, Trafalgar, Ont.	5.718	11.48	10.24	2.36	3.77	2.43	69.72
“ “ “ “ “ “	5.507	12.65	10.24	2.38	3.82	2.36	68.55
“ “ “ “ “ “	5.897	12.10	10.68	2.32	4.05	2.39	68.46
“ “ “ “ “ “	4.809	12.10	10.85	2.11	4.60	1.88	68.46
George Baker, Woodhouse.	4.265	11.89	11.20	2.14	4.37	2.44	67.96
Gaylord Greenman, Charlotteville.	5.038	11.38	11.03	2.19	3.90	2.13	69.37
Thomas Puzey, Woodhouse.	5.597	11.41	11.20	2.06	3.60	2.32	69.41
Ralph Brewels, White Church, Ont.	5.598	10.99	10.85	2.29	3.87	2.55	69.45
Andrew Clifford, St. Joseph's Island.	5.768	12.74	10.68	2.05	4.07	2.43	68.03
“ “ “ “ “ “	5.520	12.38	9.28	2.28	4.50	2.25	69.31
Major Thomas Walker, Ancaster, Ont.	5.820	12.07	10.68	2.44	3.87	2.31	68.63
Wm. Tuck, Nelson, Ont.	5.820	12.87	11.03	2.29	3.75	2.42	67.64
Wm. Tuck, Watertown, Ont.	5.783	13.61	10.50	.56	4.05	2.48	68.80
Richard P. Wilson, Trafalgar, Ont.	5.797	13.55	10.50	1.24	4.00	2.36	68.35
Ralph Brewels, White Church, Ont.	5.547	12.47	11.03	2.38	4.12	2.58	67.42
T. Pyke, Markham, Ont.	5.351	13.40	9.28	1.26	3.95	2.32	69.79
Means.	5.262	11.96	10.57	2.06	4.10	2.41	68.90

Barley contains less gluten and more starch than the other grains. That used for feeding purposes should be rich in albuminoids, while for brewing it is generally held that the carbo-hydrates should predominate. An eminent authority says that “a good brewing barley should have a thin, clean, wrinkled husk, closely adhering to a plump, well fed kernel, which, when broken, appears white and sweet, with a germ full and of a pale yellow colour. The specific gravity being between 1.280 and 1.333, and weighing from 53 to 58 pounds per bushel.”

A tabular comparison of the barleys analysed is as follows:—

From.	No. Samples.	Weight 100 kernels.	Moisture.	Albu- minoids.	Ether extract.	Crude fibre.	Ash.	Carbo- hydrates.
California.	1	4.679	10.35	8.58	2.22	5.15	2.47	71.23
Illinois.	3	4.895	11.60	8.96	2.14	4.05	2.34	70.97
Indiana.	1	3.403	11.47	10.33	2.05	5.62	2.52	68.01
Kansas.	1	3.190	11.57	11.73	1.93	5.07	2.95	66.95
Michigan.	1	4.873	9.35	13.83	2.19	1.85	2.44	70.34
Minnesota.	1	4.445	9.24	12.78	2.42	4.55	2.64	68.37
New York.	9	4.079	11.65	10.91	2.09	3.98	2.52	68.84
Ohio.	2	3.280	11.06	11.20	2.09	4.70	2.15	68.80
Pennsylvania.	1	3.897	8.92	12.95	2.41	4.47	2.83	68.42
Utah.	6	4.262	9.77	10.42	2.11	3.52	2.24	71.93
Washington.	4	4.699	10.61	9.46	2.14	4.28	2.47	71.07
Wisconsin.	1	3.240	11.72	10.85	2.27	5.17	2.75	67.24
Wyoming.	1	4.090	10.32	12.08	2.23	2.00	2.24	71.13
Argentine Republic.	2	4.185	12.66	10.24	1.63	3.94	2.76	68.78
Canada.	20	5.262	11.96	10.57	2.06	4.10	2.41	68.90
Spain.	1	5.731	11.67	9.45	1.75	4.50	2.40	70.23

REPORT OF THE POULTRY MANAGER.

(A. G. GILBERT.)

To WILLIAM SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have pleasure in submitting to you the eighth annual report of the Poultry Department of the Central Experimental Farm.

The operations of the year have been successful beyond the average. There has been a marked and gratifying increase in the number of farmers who are giving their poultry proper care and management, so as to make them revenue producers. In proof of this, I give the following extract from a letter lately written by Mr. David Moir, a farmer near Almonte, Ont., and a director of the North Lanark Agricultural Association. He says: "The addresses given last winter in Carleton Place and later in Pakenham have awakened a lively interest in their poultry by the farmers. There has been more money spent in lumber and tar paper, wherewith to build poultry houses, since last spring, than in five years. The hen to-day is where the cow was fifteen years ago and that should not be. We (farmers) should be able to put our poultry and eggs on the English market in the same condition as the cheese."

Among the subjects treated in this report are:—

The different markets for eggs.

The cause of so many bad eggs being placed on the summer market.

How to prevent bad eggs from being placed on the market.

The result of different rations in egg production.

The chickens hatched; their care and progress.

Characteristics of different crosses.

And other matter which it is hoped will be found interesting and instructive to the farmers and the poultrymen of the country.

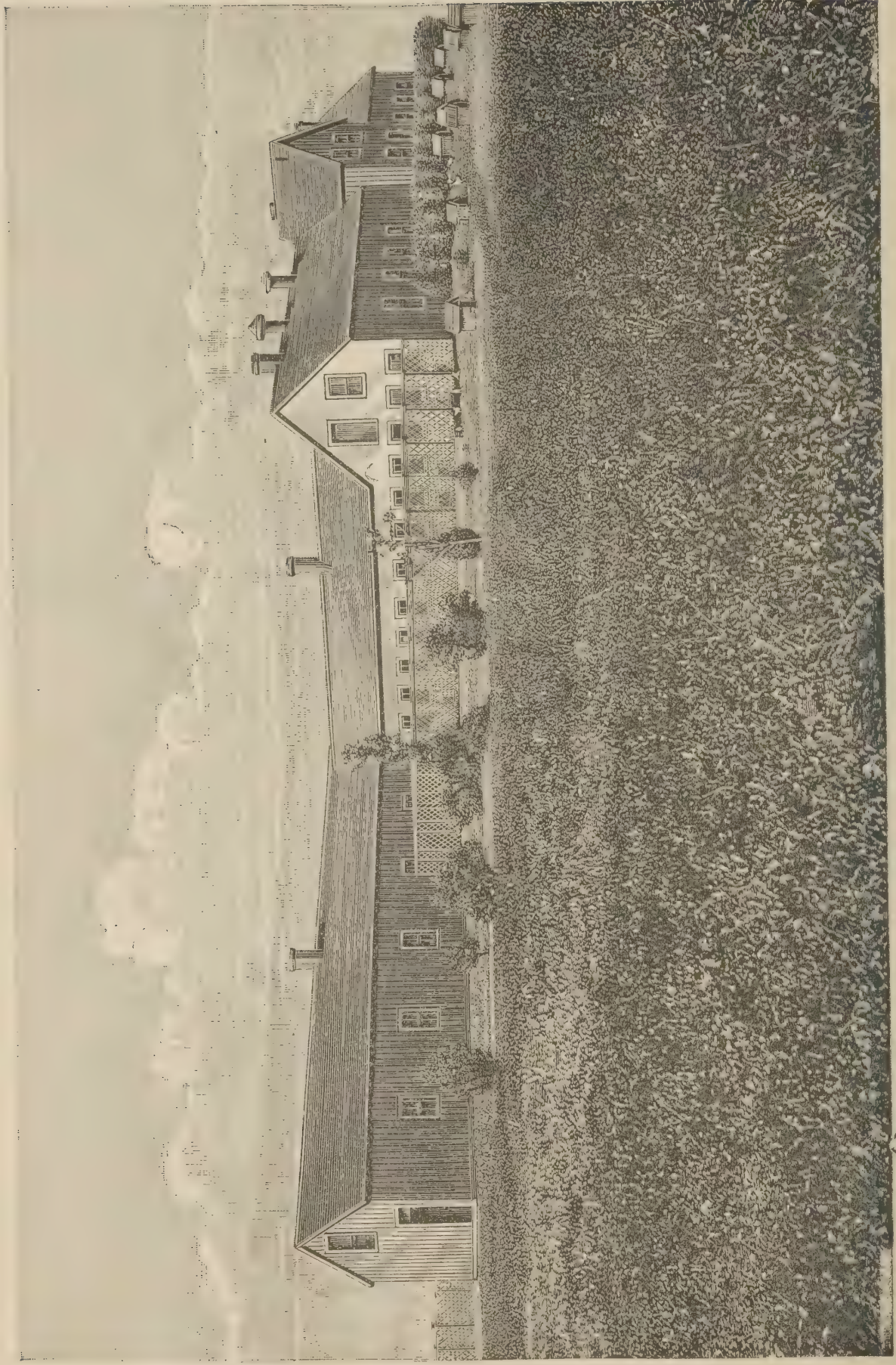
The laying stock during their moult were carefully looked after. No attempt was made to stimulate egg production during that period. The hens, however, were fed a generous diet, in order, to induce the growth of new feathers and they had the run of a grass and clover field in rear of the main poultry building. As soon as they were completely over their moult they received a liberal allowance of cut bone, and winter laying had fairly commenced by the end of November.

As in previous years cut green bone was found a valuable incentive to egg production and also beneficial, in smaller quantities, during the moulting period. During the month of December 943 eggs were laid. Particulars will be found in proper place. An illustration of the poultry buildings will be seen on following page. A ground plan of the buildings is also given on page 243.

During the year a number of meetings in different parts of the country were attended. At these meetings addresses on the management, care and proper housing of poultry were delivered.

I am, sir, your obedient servant,

A. G. GILBERT,
Manager Poultry Department.



VIEW OF POULTRY HOUSES, CENTRAL EXPERIMENTAL FARM, OTTAWA.

RATIONS.

A great part of my report of last year was devoted to the consideration of different kinds of rations, within easy reach of the farmers and calculated to make their hens lay in winter. In reports of previous years the production of eggs at that season, has been urged from a money making basis. In a bulletin on "Poultry and Eggs" issued from the Department of Agriculture in 1894 the subject is laid before the farmers as follows:—"The (winter) market is comparatively undeveloped, because few farmers realize the value of their poultry as money makers. In order to make the most money out of their poultry the aim of the farmers should be to dispose of their eggs when they are highest in price viz: the winter season. He would be considered a poor business man who should hold his stock until it was of least value and then begin to sell it. Yet it is something similar our farmers are doing with their poultry. During winter their laying stock have remained non-productive, very likely at actual loss. With the advent of warm spring weather everybody's hens begin to lay and prices go down to their lowest. It is at this time the hens of the great majority of farmers begin production."

THE DIFFERENT MARKETS.

The quotation still applies with force to the greater portions of the Dominion, but that our farmers are beginning to realize the value of their poultry as money makers, is evidenced by the increasing demand for information as to the proper care and management of their birds, as well as by the increasing number of new laid eggs placed on the market in recent winters. It may be said that if a greater number of eggs are being placed on the winter market, there will soon be enough to supply that market. Granted, that there has been a greater supply of new laid eggs in recent winters, there is also the fact that prices were never higher in Ottawa and Montreal at any rate—than they were last winter, which goes to show that if there has been greater production there has also been a correspondingly increased demand. And both surely go to prove that there is a better market, offering better opportunities to our farmers to make more money out of their poultry than heretofore.

A SUMMER MARKET.

Observation and experience of the markets in recent years lead to the conclusion that the winter market is not the only paying one, but that there is a great and growing demand, in the summer months, for new laid eggs of unimpaired flavour.

As for THE ENGLISH MARKET it is practically unlimited. A bulletin issued from the Finance Department in October, 1892, states in effect that an UNLIMITED, STEADY and PROFITABLE trade can be done with England in Canadian poultry and eggs.

COULD WINTER PRICES NOT BE LOWER, AND YET REMUNERATIVE?

In proof of the high prices of winter, it may be stated that the writer attended an agricultural meeting in Montreal during January of 1895, when he was informed by several farmers present that they had sold new-laid eggs the week previous at 60 cents per dozen to choice customers. It is but right to say, at the same time new-laid eggs were selling at 35 cents per dozen retail in Toronto, and 25 cents per dozen in London, Ont.; in Manitoba and the North-west prices ranged from 35 to 50 cents per dozen, according to locality. Mr. Sutherland, assistant secretary of the Montreal Poultry Association, wrote later on that he had sold his new-laid eggs during that winter at first named price. Eggs at 60 cents per dozen meant that they were a luxury which only

the rich could indulge in. If eggs were put on the Montreal market during winter in such numbers that lower prices would follow, it is only reasonable to suppose that more people would purchase them. There is no reason why the great masses should not be supplied with new-laid eggs in winter, rather than the ill-flavoured, artificially preserved article, at a price within the reach of all, and there yet remain a paying margin of profit to the farmer. What then are remunerative prices?

WHAT ARE REMUNERATIVE PRICES?

In order to find out what are remunerative figures, the summer market prices, at about their lowest points, viz., 12 to 15 cents per dozen, are taken. The following calculation is made, based on the experience of several practical breeders:—

100 eggs from hen for 1 year, at 1 cent each.....	\$1 00
10 chickens hatched by her, at 10 cents each.....	1 00
Body of hen to sell or eat.....	0 25
	<hr/>
	\$2 25
Deduct cost of hen for year.....	\$1 25
	<hr/>
	\$1 00

We have, according to the foregoing, a margin of \$1 per hen profit per annum, taking eggs at 12 cents per dozen. No figure is placed upon the manure, which is valuable when made into a compost. It may be said that the cost of producing the egg is greater in winter. But this statement may be met by the other, that the cost of production is little in summer, for at that period the farmer's hens, in most cases, are allowed to forage for their living. So that the cost of \$1.25 per hen per annum is very fair—if anything, it is on the high side. It will be seen that eggs, at the summer price of 12 cents per dozen, afford a paying margin. Surely then, with the modern and cheaper rations, prices during the winter season could be much lower, and yet afford a fair margin of profit.

SUMMER PRICES MISLEADING.

But the summer price of 12 cents per dozen is a misleading one, for in reality it should be placed at twice the figure. Twenty-four cents per dozen for eggs in midsummer? Yes, and in this way: It is a well-known fact that during the midsummer months it is hardly possible to buy from farmer or storekeeper a dozen or two eggs that will all be found good; that in the majority of cases half of the eggs will be likely unfit for eating purposes. In the case of a dozen eggs, making the six actually worth twelve cents, or TWENTY-FOUR CENTS PER DOZEN, and probably the flavour of the remaining six will not be such as new-laid eggs ought to have.

There is not the slightest doubt that the great majority of purchasers would rather pay twenty-four cents per dozen, in the first place, for a reliable article than half the amount for inferior goods. There is no intention to say that our farmers bring into the markets, or sell to the dealers, or that the latter dispose of, bad or ill-flavoured eggs, knowing them to be such. On the contrary the farmers, as a rule, unfortunately give as little attention to the age, or condition of the eggs they are taking to market, as they give to the fowls which laid them. The questions may be asked, How can we tell what the inside of an egg is like? How can we distinguish the bad eggs from the good ones?

PRECAUTIONS THAT SHOULD BE TAKEN.

The answer to the above queries is that while the farmer is not supposed to be in the van of poultry lore as to the means of discovering partially hatched, or ill-flavoured eggs from the new laid ones, yet there are simple precautions which he may take, in

order to secure the new article and which he is in duty bound, in the interests of his customers, to take. By observing the following, eggs of fine flavour may be sold during the entire summer season :—

1. Keep no male bird with the laying stock.
2. Collect the eggs once or twice every day.
3. Take no eggs to market gathered from under barns, nests in the fields or from stolen nests.
4. Prevent, if possible, the laying hens eating decayed vegetable, or animal substances.
5. Keep the eggs after gathering them in a cool, sweet atmosphere. If in a cellar let it be dry.
6. Keep the nests the layers use clean, comfortable and free from vermin.
7. Have a sufficient number of nests for the layers. Offer every inducement to the hens to lay in these nests and not shun them.
8. Allow no brooding hen to sit on the new laid eggs, be it for ever so short a period.
9. Take the eggs to market clean and inviting in appearance.
10. Make it a rule to take no eggs to market that you are not sure are fresh, or that you are doubtful about the flavour being good.

There is not one of the above suggestions so difficult as to prevent its being put into immediate practice.

WHERE DO ALL THE BAD EGGS COME FROM?

The question is frequently asked and much speculation indulged in as to where all the bad eggs come from, particularly in summer time? And that leads to the question : What is a bad egg?

In the past eight years large numbers of eggs have been handled in our poultry house. Many eggs have been put under hens, or in incubators, and close observation has been made of these eggs during incubation, and afterwards of the eggs which failed to produce chickens. The eggs, in course of incubation, were also tested at the end of six or seven days and note taken of the varied appearances presented. No small amount of experience was gained, and it leads to the classification of the different sorts of eggs met with, and the cause therefor, as follows :—

1. THE FERTILE EGG in which the germ is in a well advanced stage, with the promise of making a strong vigorous chicken.
2. THE ADDLED EGG, or one in which the germ has started, but from some cause its progress has been arrested, when decay sets in and you have a very ill-flavoured article.
3. THE CLEAR OR UNFERTILE, which contains no germ and presents the appearance of a new laid one.
4. The egg containing a broken or ruptured yoke and which presents a similar appearance to No. 2.

The state of Nos. 1 and 2 can only result from fertilization.

No. 2 is the egg most frequently met with, and is probably the result of taking eggs from nests under barns, or stolen nests, or nests on which the hen has been sitting some days.

No. 3, the clear or unfertilized egg, can be used for cooking purposes with every confidence after examination by tester on the seventh day. The unfertilized eggs are frequently removed after the fertilized eggs have hatched out into chickens (on the 21st day) and boiled hard and fed to the chicks.

PRESERVE THE FLAVOUR OF THE EGG.

Having secured the non-fertilized new laid eggs, care should be taken to preserve the flavour intact. The shells of the eggs are porous, and contaminating surroundings will doubtless affect the egg. The unfertilized egg may be kept in a cellar, with pure atmosphere, for many weeks and yet retain its flavour. In course of time it may shrink and

partially dry up from evaporation, but there is no germ to start on its mission of bringing about change as soon as the conditions are favourable, or partly so.

Mr. C. A. Cyphers, of Boston, the author of "Incubation and its Natural Laws," admitted to be one of the best works on the subject ever published, in a letter to the writer says: "An unfertilized egg will keep longer than the other, and an egg from a hen fed on corn will keep its flavour better. The eggs should be kept in a sweet atmosphere."

A GOOD FLAVOUR ALL IMPORTANT.

It must be borne in mind that it is THE FLAVOUR of the egg that is all important to keep intact. And on this point a farmer in the neighborhood of New York City who sends thousands of eggs per week to that city, writes to the *Rural New Yorker*, "that if a brooding hen is allowed to sit on a new laid fertilized egg for twelve hours that the flavour of that egg is ruined." The same authority, who uses a large number of incubators, says that he tests his incubator eggs on the fifth day, and all the clear or unfertile eggs he removes, marks them as such, and ships them to New York City, where they are sold for cooking or baking purposes.

In our poultry department eggs have been tested on the sixth and seventh day and the unfertile eggs have frequently been boiled hard wherewith to feed the chicks. On some occasions, at the end of the hatching period of twenty-one days, the clear, or unfertile eggs have been removed from the nest and boiled hard to mix up with chicken food. All poultry men know that is impossible to boil a rotten egg hard.

It must not be inferred from the foregoing that unfertilized eggs should be kept a long time before being taken to market. Eggs, as advised in a previous page, should be sold as soon after being laid as possible. There are cases where the farmer is some distance from the purchaser, or cannot come to market as frequently as one nearer to the city. In such a case the eggs for sale may have to be kept some time, and it is all the more important that they should be unfertilized and kept in a cool, sweet atmosphere.

A BETTER PRICE FOR UNFERTILIZED EGGS.

In the opinion of the writer it is only a matter of time and education, when eggs for sale in summer will have to be guaranteed as unfertilized by the seller before a purchase will be made. Indeed the subject is already receiving practical attention. The following letter shows that unfertilized eggs shipped from the town of Pakenham, Ont., to a city customer during the past summer brought better prices.

DEAR SIR,—Our dealing with Messrs. Bate and Co., during the past summer, has been very satisfactory. They gave us more than the market price. Mr. Bate said he was well satisfied with the quality of the eggs we sent.

W. M. McARTHUR.

The eggs were unfertilized, as I was assured by Mr. McArthur; were clean and inviting in appearance; of good size; carefully packed and as a result received what they deserved from a shrewd business firm, a better price than the market figure. Is there not a moral in the transaction, by giving heed to which our farmers might profit? Other instances might be given, but the above will suffice.

A PROSPECTIVE QUESTION ANSWERED.

While on this subject, a prospective question likely to be asked, in connection with its discussion, may as well be answered, viz.: If we are to allow no male bird with the laying stock how are we to breed our chickens? Easy enough, by picking out in early spring time, or better still, if circumstances will permit by keeping apart all winter and not stimulating them to lay—nine or eleven of your best layers and best shaped birds. Mate them with an unrelated, healthy well-shaped two-year old cock, if the birds are

pullets or yearling hens and a cockerel if they are two years old. When eggs enough have been saved to hatch out what chickens you wish, close up, kill, or dispose of the male bird and after keeping the hens he has been mated with, inclosed for a week longer let them run with the other laying hens, with which there is, of course, no male. And having saved eggs for hatching from birds selected for good qualities, superior progeny are likely to follow. The chickens from eggs saved from such mating, will certainly be better, in every way, than those bred in the usual hap-hazard manner. As to keeping the male bird with the laying stock, the following is again quoted from Experimental Farm Poultry Department report of 1889, viz. :—"The cock bird is a nuisance in the pen of layers. He not only monopolizes the most of the food, but teaches the hens to break eggs and so learn to eat them. Besides the stimulating diet is too fattening for him and will ruin him as a breeder."

CONCLUSIONS FROM THE FOREGOING.

In noting, in the foregoing, the features of the different markets, the demand and supply peculiar to them and the requirements of the various seasons, the following conclusions may be arrived at, viz. :—

1. That our home winter market offers the inducement of high prices for new laid eggs.
2. That notwithstanding greater production in this district—prices were never better than they were last winter.
3. That there is no reason why new laid eggs should not be produced, in winter, in such quantity as to take the place (in a very great measure) of packed, or preserved eggs.
4. That with the modern and cheaper rations in vogue, winter prices could be much lower than they are and yet afford a profitable margin.
5. That eggs in the summer months which can be relied on as being new laid and of good flavor, will bring better prices than the ordinary article.
6. That so many summer eggs are bad, or ill-flavored because (a) they are not unfertilized ; (b) not collected immediately after being laid ; (c) not brought to market soon after being laid.

RATIONS FED LAST WINTER (1894-95.)

THE DIFFERENT BREEDS AND HOW THEY LAID.

The time is not far distant when the points touched upon in the foregoing pages will be patent to and practised by the majority of farmers. The aim of the farmer should be to lessen as much as possible the cost of production, so as to have the greater margin of profit. And it is with the object of aiding him so to do that the experimental winter work of some years past has been carried on, particular attention having been given to egg producing rations.

The rations during the winter of 1894-95, beginning with date of report, viz., the first day of January, were as follows :—

MORNING RATION—Warm mash composed of ground wheat, ground oats, ground barley or ground rye and bran. A little of all sometimes and again only three of the ground grains. Enough of this was fed to satisfy but not to gorge the hens.

NOON—A little grain of some kind, to keep the hens busy scratching.

AFTERNOON—A liberal ration of wheat or buckwheat, mostly the former.

Occasionally cut bone was given in lieu of the morning or afternoon ration, but it was frequently given, at one time or the other, and with excellent results. The value of cut green bone as an incentive to egg production cannot be overestimated.

GREEN FOOD—Green stuff in the shape of cabbages, turnips or mangels was liberally fed and much relished. Occasionally clover hay was steamed and mixed in the mash.

GRIT—Broken oyster shells and mica and limestone grit were supplied in liberal quantity.

DRINK WATER—Pure drink water was liberally supplied in fountains in Nos. 1 and 2 houses and in pails or shallow dishes in No. 3. The fountains proved the better way, except in very cold weather, when their contents froze and were rather difficult to thaw out.

All grain fed was given in such a way as to make the hens work in order to get it. The straw on the floor of some pens was superior to the earth on some of the other floors, as a means of making the hens search for the grain.

ARRANGEMENT OF THE DIFFERENT BREEDS.

The fowls in the three poultry houses were arranged as follows at the beginning of the month of January, 1895 :—

	Hens.	Pullets.
Barred Plymouth Rocks.....	8	11
White Plymouth Rocks.....	11	..
Silver Laced Wyandottes.....	4	7
White Wyandottes.....	6	..
Langshans.....	6	11
Light Brahmas.....	11	4
White Leghorns.....	11	16
Black Minorcas.....	11	18
Andalusians.....	11	..
White Minorcas.....	..	11
Coloured Dorkings.....	..	11
Golden Polands.....	9	..
Houdans.....	6	..
White Javas.....	..	4
Langshan—Black Minorca cross.....	8	..
White Leghorn—Brahma cross.....	6	..
Other crosses.....	24	..
	132	93

Of the above number the following were purchased in the latter part of November, 1894, with the object of obtaining new breeds for trial, younger stock and new blood, viz. :—

- 11 White Leghorn pullets.
- 11 Coloured Dorking pullets.
- 11 White Minorca do
- 7 Barred Plymouth Rock pullets.
- 7 Langshan do
- 4 Silver Laced Wyandotte do
- 4 White Java do

The new breeds were the Coloured Dorkings and White Minorcas. Eleven pullets of different breeds were put in each of the ten pens in No. 1 house. Pullets were taken from our own stock to make up the number of layers to eleven, in cases where necessary to do so. As there were not enough pullets of the breeds named to fill the ten pens, in two cases yearling hens were used, and in one case three-year-old Brahmas. As arranged the stock in No. 1 house, stood as follows :—

BREEDS IN No. 1 HOUSE.

NORTH WING.

- Pen No. 1— 8 Silver Laced Wyandotte pullets, 4 hens.
- do 2—11 Barred Plymouth Rock do
- do 3—11 White do yearling hens.
- do 4—11 Langshan pullets.
- do 5—11 Light Brahma hens, 3 years old.

SOUTH WING.

- Pen No. 1—11 White Leghorn pullets.
do 2—11 Black Minorca yearling hens.
do 3—11 White do pullets.
do 4— 7 Andalusian hens, 4 pullets.
do 5—11 Coloured Dorking pullets.

The object aimed at was, by placing the different breeds side by side, to give them opportunity to show what they could do in egg production. But as some of the pullets were later hatched than others, they did not begin to lay as soon as the older ones and results were not as satisfactory as anticipated. The coldness of the house had also an apparent effect in retarding the development of the late hatched pullets and egg laying in the older ones. The result in eggs for the six months beginning from the 1st of January, 1895, was as follows:—

—	—	Jan.	Feb.	March.	April.	May.	June.	Total.
7 pullets, 4 hens....	S. L. Wyandottes...	89	71	96	104	69	45	474
11 do	Barred P. Rocks....	80	88	77	142	115	105	607
11 hens (1 year)....	White do	80	61	83	106	88	12	430
11 pullets.....	Langshans	83	112	105	112	94	57	663
11 hens.....	Light Brahmas	5	23	54	72	38	27	219
15 pullets.....	White Leghorns	81	96	137	154	141	98	707
11 hens (1 and 2 years)	Black Minorcas.....	75	51	44	82	94	65	411
11 pullets.....	White do	7	35	56	45	81	72	296
7 do 4 hens.....	Andalusians	43	37	64	92	117	109	462
11 pullets.....	Coloured Dorkings.. ..		25	73	68	73	19	258

It should be stated that it was only for six weeks that the White Leghorn pullets numbered 15. For the most part of the time their number was the same as the others. The greatest egg production actually came from the Barred P. Rocks, closely followed by the Langshans. The latter were, perhaps, the later hatched of the two. The White Minorcas did not show much vigour during the early part of the winter, and several of them died during the early part of the month of March. The Coloured Dorkings were, apparently, late chickens, and were slow in maturing. The Brahma hens did not do well as they were three years of age and were likely fat.

No. 2 HOUSE.

In this house 7 or 9 hens of the following breeds were placed in different pens to be used as breeding stock viz. :—Barred P. Rocks, Langshans, Light Brahmas, (4); Houdans and Golden Polands. In this house were also the male birds to be used as breeders in spring.

No. 3 HOUSE.

In this house were the following birds:—

1. Pen of 9 Black Minorca pullets, late hatched.
2. do 9 do do do
3. do 4 White Java do
4. do 8 Langshan do
5. do 6 W. Leg-Bra. cross hens.
6. do 8 Indian Game cross do
7. do 11 White Leghorn do

and a number of other hens kept for sitters.

The intention was to have the crosses lay as much as possible during the winter, so as to make early spring sitters, using them as such in preference to thoroughbred stock.

The old White Leghorn hens were kept to make up a second breeding pen should it be necessary so to do in the breeding season.

It was much easier to keep the temperature in No. 3 house at a moderate degree of warmth with a base burner stove than it was in No. 1 house. In sudden drops of temperature the thermometer in the last named house would go as low as 15 and 20 below freezing, with the result that water, vegetables and droppings would all be frozen solid. On such occasions the thermometer outside registered 20 to 23 degrees below zero and was accompanied by a piercing wind. As in the case of No. 3. house, a base burner stove was used.

The rations fed to all the laying stock are given in full in another place.

The total egg yield from 1st of January, 1895, to 1st of July, of the same year, is given below. On the first day of July the male birds were removed from the breeding pens and the hens were allowed to run together in the fields in rear of the poultry houses.

Eggs laid from 1st January to 30th June, 1895.

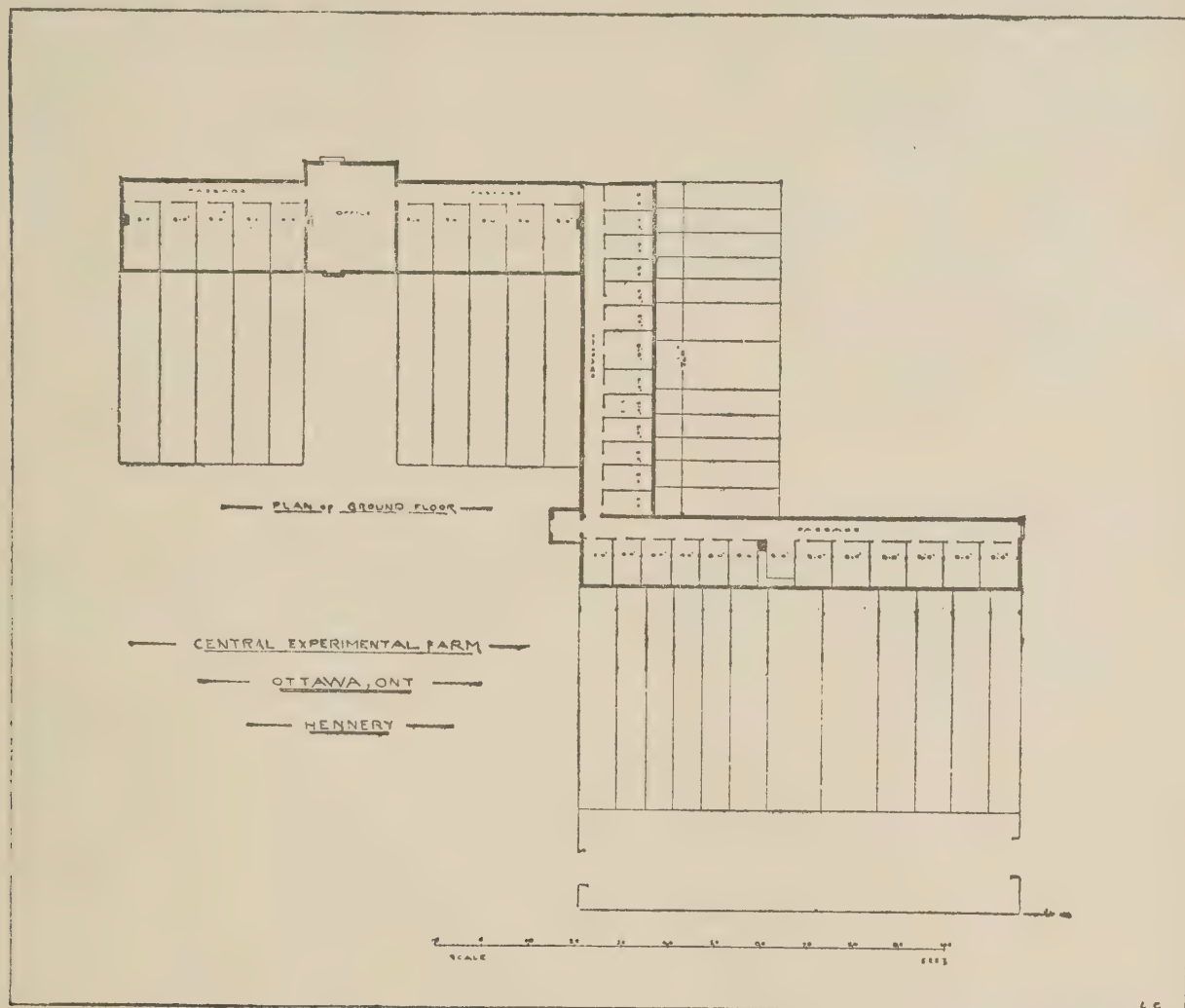
Breeds.	Age.	January.	February.	March.	April.	May.	June.	Total.
7 Silver Laced Wyandotte pullets.....	4 hens.....	89	71	96	104	69	45	474
Barred Plymouth Rocks	11 pullets.....	80	88	77	142	115	105	607
do do	8 hens.....	42	23	43	Sitting.			108
White Plymouth Rocks.....	11 do	30	61	83	106	88	12	430
Langshans	11 pullets.....	83	112	105	112	94	57	563
do	6 hens.....	25	20	21	37			103
Light Brahmas.....	11 do	5	23	54	72	38	27	219
do	4 pullets.....		8	18	32	39	2	99
White Leghorns.....	16 do	81	96	137	154	141	98	707
do	11 hens.....			54	111	69	57	291
Black Minorcas.....	11 do	75	51	44	82	94	65	411
do	18 pullets.....	18	94	86	171	146	154	669
White Minorcas.....	11 do	7	35	56	45	81	72	296
Andalusians	11 hens.....	43	37	64	92	117	109	462
Coloured Dorkings.....	11 pullets.....		25	73	68	73	19	258
White Wyandottes.....	6 hens.....	30	23	21	46	33	13	166
Golden Polands	9 do			7	45	62	39	153
Houdans.....	6 do		16	25	50	26	12	129
White Javas	4 pullets.	56	64	76	71	83	55	405
Crosses.								
Langshan-Black Minorca cross.....	8 hens.....	31	88	90	Sitting.			209
Leghorn-Brahma cross.....	6 do	35	48	30	do			113
Sundry other crosses.....	24 do	39	97	127	283	235	193	971
								7,843
July—Eggs laid. Hens running at large.....								456
August								438
September								246
October.....								23
November								160
December								943
Total for year.....								10,109

The above figures are not given to show the best that could be done under conditions more favourable. What is meant by more favourable conditions may be explained in this way. In the number of layers given are included about 24 old hens and the mixed hens kept for sitters. As the warmer weather approached the sitters became broody and they were given eggs. At one time there were 40 hens either with chickens

or sitting on eggs. Other hens would become broody and some time would elapse before they would be broken up and begin egg-laying again. Thus the number of layers were considerably reduced.

What would a farmer do, under the circumstances?

He would keep a sharp watch on his hens and kill off the non-productive ones, or else they would certainly reduce the profit made by the active layers. If he had a non-sitting breed he would have to keep a few of a sitting variety to hatch out his chickens, or, he might have a small incubator and brooder. It has been shown in a previous portion of this report how he could select his breeding stock from his largest, best shaped, and most prolific layers, mating them with a vigorous male which had been kept apart from them during the winter season.



GROUND PLAN OF POULTRY BUILDINGS, OTTAWA.

The following will show how the breeding pens were made up and the number of eggs set and chickens hatched :—

BREEDING PENS MADE UP.

About the beginning of March, and towards the middle of the month, the different breeding pens were made up, composed of White Leghorns, Black Minorcas, Andalusians, Coloured Dorkings, White Minorcas, Barred and White Plymouth Rocks, Silver Laced and White Wyandottes, White Javas, Light Brahmas, Langshans, and Golden Polands.

The following were mated with the view of producing crosses to make good layers and market fowls.

8c—16½

Houdan cock ; 4 Light Brahma pullets. White Java cock ; 3 White Leghorn hens. Wyandotte cock ; 7 Andalusian pullets. Barred Plymouth Rock cock ; 3 Coloured Dorking hens. Indian Game cock ; Coloured Dorking hens, Langshan pullets, and Red Cap hens.

EGGS SET AND CHICKENS HATCHED.

When Set.	Description of Eggs.	Chickens Hatched.	Remarks.
March 31..	26 W. Java eggs.	19	Pullets eggs.
April 10..	13 Light Brahma eggs.....	6	Old hens, rather fat.
do 28..	26 S. L. Wyandottes eggs	14	Eggs from a farmer.
do 28..	15 Light Brahma eggs	7	
do 30..	24 P. Rock-Dorking cross.....	17	
do 30..	26 S. L. Wyandotte eggs	17	
do 30..	13 White Java eggs.....	12	
May 7..	15 Indian-Game Langshan cross eggs.....	10	
do 7..	15 Houdan-Brahma cross eggs.....	6	
do 7..	15 S. L. Wyandotte-Andalusian cross eggs..	10	
do 13..	26 W. Minorca eggs.....	14	
do 13..	26 B. Minorca eggs.....	14	
do 15..	26 White Plymouth Rock eggs.....	13	
do 18..	13 Andalusian eggs.....	6	Several eggs broken.
do 25..	26 White Java eggs	18	
do 25..	13 White Leghorn eggs.....	8	
do 31..	13 Golden Poland eggs.....	8	Breeding stock old.
		199	

It is worth noting, while reading the above table, that the White Java eggs, which were set on the 10th of March, were from four early pullets of the year before ; that these pullets laid well all winter and on being early mated their eggs, some time after, proved fairly fertile, giving 19 chicks out of two settings of eggs. The chickens were hardy from the first and made rapid development. Indeed, the eggs from these Javas hatched remarkably well during all the season, so giving proof of sturdy and vigorous inherent qualities. The Light Brahma eggs did not do well, owing to the hens being three years of age and at that age predisposed to take on fat. The Plymouth Rock Coloured Dorking cross eggs hatched well.

PROGRESS OF THE CHICKENS.

The early hatched White Java cockerels made development of one pound per month. They were attended to and regularly fed and watered, as all chickens should be. The progress made will compare favourably with previous years- Some of the weights are given as follows :—

White Java Cockerels, hatched March 31 ; on 14th September following weighed 6 lbs. 5 ozs. ; 5 lbs. 7½ ozs. ; 4 lbs. 13¾ ozs. : Plymouth Rock-Dorking Cross, hatched 30th April, weighed 14th September, 4 lbs. 1 oz. ; weighed 20th November, 6¾ lbs. Indian Game-Langshan Cross, hatched 7th May, weighed on 14th September, 4 lbs. 6 ozs. ; weighed on 19th December, 7 lbs. 8 ozs. A pair of these chickens at the latter date made 14 lbs. 13 ozs. live-weight. Houdan-Brahma Cross, hatched on 7th May, weighed on 14th September 4 lbs. 5¼ ozs. ; weighed on 20th December 6 lbs. 4 ozs.

HOW THE CHICKENS WERE CARED FOR.

On hatching out, the chickens were allowed to remain undisturbed in their nests for 24 or 30 hours, when with the mother hen they were removed to a coop on the grass outside. The mother was given food and water, and if strong enough on their legs, the chicks received a small quantity of bread crumbs, or a very small quantity of stale bread

soaked in milk and squeezed dry. If the chicks did not show any inclination to eat, they were allowed to brood under the hen, or bask in the sun until strong. If the weather was too cold, the hen and chickens were placed on dry sand, in a coop or pen by themselves, in a comfortable temperature inside. The dry bread crumbs were stopped after the first day and granulated oatmeal substituted therefor. Rice boiled dry was added to the bill of fare, and on this and the oatmeal and stale bread soaked in milk and pressed dry, the chicks made rapid progress. When about a fortnight old, wheat was fed in small quantities, and a coarser and cheaper mash of cornmeal, shorts and ground oats was given in place of the bread and milk. It is a good plan to send the chicks to brood for the night, with their crops full. Milk for drink was found an excellent incentive to growth. The chicks require great care until they get well on their feet and as remarked in previous reports, the future fowl is either made or marred in the first five weeks of its existence. To make heavy market birds, the cockerels require to be generously fed, and as they grow, cheap and nutritious rations must be fed, and in these the table and kitchen waste can enter with advantage. The same treatment must be given to pullets if they are to be early layers. Care was also taken to keep the chickens free from lice. And it is also requisite that the mother hen should be dusted regularly with insect powder in order to keep her free from these pests. Half the supposed ailments of chickens are the result of lice on the young birds. Free range, after five or six weeks, with liberal feeding, will cause rapid development. The reason why the hen should be confined to a coop (until she is ready to leave her chicks) is that the chicks in that way can be fed more frequently, and put on flesh more quickly. Whereas if she was dragging them about she would be taking off much of the flesh it is all important to get on them as quickly as possible.

WHEN PULLETS BEGAN TO LAY.

One of the White Java pullets began to lay on the 12th November, followed by two others on the 15th of the same month, and they have laid regularly since. On the 9th of December one of the Andalusian pullets laid her first egg, and she was followed a few days after by a Wyandotte-Andalusian cross pullet. A Silver Laced Wyandotte pullet laid her first egg on 20th December. A P. Rock-Dorking cross pullet laid first egg 20th December.

HOW AND WHEN WINTER LAYING COMMENCED.

During the moulting season of latter part of September, October and November the hens were well cared for and given rations similar to those fed for egg production. The hens had a free run in a field in rear of the main poultry building from time of breaking up the breeding pens on the 30th of June. The male birds at that date were removed to a separate building and will there remain until put into the breeding pens next spring. As the moulting season approached, egg production slackened until it almost ceased. As soon as the moulting season approached, liberal rations were given, beginning with a warm mash, a grain ration at noon and a generous grain ration at evening. The result was not evident for some time, but as the new feathers appeared the hens presented a very fine appearance.

FEEDING FOR EGG PRODUCTION.

Towards the end of October, with a view to egg production the feeding of cut green bone, occasionally was commenced. During November cut bone was fed more frequently, about three times per week, and daily for noon ration at end of the month when the fowls were shut into winter quarters. At the beginning of December, a warm mash composed of two parts ground wheat, one part ground oats and one part pea-meal was fed three mornings of the week. Cut bone was fed in small quantities every day at noon. The afternoon ration was wheat thrown into the straw and fed early enough to permit of the hens searching for it. Indeed, it is the rule whenever grain is fed to throw

it into the litter on the floor of the pens, when the hens eagerly seek for it. Cabbages were hung in the pens and the fowls eat them with avidity. Grit was supplied in abundance, as also drink water.

The response to this treatment was most gratifying, the egg yield beginning in the second week of November with 6, 8 and 10 eggs which gradually increased in number until the second week in December when they numbered 18, 22, 32, 36 and as high as 53 per diem, making a total egg yield for December of 943 eggs. The eggs laid and now being laid, are of the size usually laid by the different breeds and are of delicious flavour.

FIRST BREEDS TO RE-COMMENCE.

The first to resume laying were the White Javas, White Plymouth Rocks, Silver Laced Wyandottes, White Leghorns, Barred Plymouth Rocks and some of the crosses. They were followed in the middle of December by the Langshans and Andalusians

CHARACTERISTICS OF SOME CROSSES

Indian Game-Brahma.—The hens of the Indian Game-Brahma cross, made in the early summer of 1894, turned out large in body and compact in shape, rather taking after the Brahma. Colour of feather, light brown. They are of quiet disposition. Colour of egg, light; size, medium.

Indian Game-C. Dorking.—The Indian Game-Coloured Dorking cross also made very fine hens, taking more after the first named in shape and appearance. They are compact in body, of heavy weight and tightly feathered; egg, long in shape and light in colour.

Langshan-Black Minorca.—Both the Langshan—Black Minorca and White Leghorn—Brahma crosses, made two years ago, turned out fine specimens and magnificent layers. The first named are large black fowls, some showing the Langshan type with slight feathering on the shanks, while others distinctly show the Minorca shape. Their eggs are large and of a rich brown colour. The fowls of the Leghorn-Brahma cross are not so large nor are their eggs of the same size as the original breeds named.

Plymouth Rock-Coloured Dorking.—Of the crosses made this year the pullets of the Plymouth Rock-Coloured Dorking Cross, are of the most serviceable shape and promise. They are of the long full body of the Dorking, rather loose in feather, but in every case with the barring of the Plymouth Rock, although dark in colour. They have yet to show what they will be as layers, but the best anticipations seem warranted. One of the pullets laid her first egg on the 19th December.

The Indian Game-Langshan.—The Indian Game-Langshan pullets are all as black as crows in colour. They are tight in feather, gamy in appearance and promise to make a very serviceable and handsome fowl. Few crosses give better promise.

Houdan-Brahma.—The pullets of the Houdan-Brahma cross are of dark feather, with the tuft of the Houdan partly developed on top of head.

Wyandotte-Andalusian.—The pullets of the S. L. Wyandotte-Andalusian cross are Rose combed Andalusians of the most beautiful shape and colour. A Silver Laced Wyandotte cock was mated with several Andalusian pullets off in colour, being a smoky white splashed with blue black feathers. The result is as stated, some beautiful Rose Comb Andalusian pullets, one of which began to lay two weeks ago. The bodies of the pullets are larger than the Andalusian original, but the nervous energy of the Spanish is conspicuous. The introduction of the Wyandotte characteristics should make a layer hard to outrival.

STRAW VERSUS EARTH.

A trial has been made for two seasons of straw litter on the floors of some of the pens and of sand on others, in order to find out their relative merits. On the floor, of the pens in the north wing of No. 1 house, straw was placed. On the floor of the pens in the south wing coarse dry sand, which was mixed with a small quantity

of gravel. A quantity of sand and fine gravel was stored in the cellar in order to renew that on the floors, as occasion required. Results were altogether in favour of the straw for the following reasons:—

1. It covered the grain thrown into it much better than the sand, and was in consequence a much greater incentive to exercise.
2. It was much easier to handle and could be removed and renewed in much less time.
3. It was not so cold to the feet of the hens. Except on days of bright sunshine the fowls did not seem inclined to scratch in the sand.
4. On being removed from the pens every particle of *excreta* went with it. In the case of the sand it was found that on its being raked over a quantity of the droppings remained.
5. By the month of April the sand covered floors had become much mixed with the droppings, notwithstanding that the latter were removed daily from the platforms.
6. On the grain rations being thrown on the sand, the fowls are likely to pick up some of the contaminated floor material and disease to follow in consequence.

INCUBATOR TRIAL.

On the 16th May 100 eggs, principally from crosses, were put into an hot water incubator of the manufacture of M. Gagné, Quebec. The incubator was filled and run as per directions, but there was no result. On examination of some of the eggs after the twenty-third day,—two days over the regulation time—they all appeared to have been fertile. The *embryo* had apparently made satisfactory progress until the seventh or ninth day, when all progress seemed to have ceased. It should be stated that the eggs had been tested on the sixth day and the clear, or unfertile eggs removed. On several occasions the thermometers were examined and the incubator seemed to have kept the heat at the regulation mark, fairly well. At times there was a slight fall of two or three degrees in temperature, when hot water was put into the incubator and the proper figure of 102 reached again. The temperature of the room in which the incubator was kept was not regular. The maker claims a regular temperature of 60 degrees for the proper working of the machine. An even temperature of the figure named is very hard to keep in an ordinarily constructed poultry house, which is always subject to more or less fluctuations of temperature. With artificial heat, except in the shape of hot water pipes, it is very hard to keep a regular temperature in a large poultry building.

DISEASES OF POULTRY.

The past year has been marked by the absence of the complaints of previous years, as to diseases of a fatal nature, among poultry in different parts of the country. Several cases of roup were reported and remedies asked for. In one case, the ailment which was described as diarrhœa, was traced to overfeeding. And overfeeding with too little exercise, particularly when the laying stock are in winter quarters, are causes of many of the ailments reported from time to time.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

REPORT OF WM. M. BLAIR, *Superintendent*.

NAPPAN, N.S., November 30, 1895.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,— I have the honour to submit herewith the following report of the operations on the Experimental Farm for the Maritime Provinces, at Nappan, N.S., during the year 1895.

WEATHER.

On November 16th, 1894, the thermometer registered 23° of frost. This continued for three days, then the weather became mild, continuing so until the 26th, when the temperature again fell, registering 23° of frost. On the 29th a slight snow made sleighing in various parts of the provinces. We had fair sleighing here on December 3rd, and it continued cold until the 17th of December, when the frost in the ground was completely thawed out. On the 23rd it again turned cold, the thermometer registering at zero, and 5° below zero on the following morning.

Snow fell January 1st and 2nd, measuring about one foot deep, with the temperature at 14° below zero on the 3rd. There were several heavy snowstorms during the winter months, and the weather was very changeable at times. Sleighing continued good until April 10th, and the snow had almost disappeared by the 19th. The frost was about out of the fields by the 20th, and ploughing was commenced on the 21st.

The first seed was sown on April 27th. Seeding proper commenced on April 30th, and the weather continued favourable until its completion. There was only a moderate amount of rainfall in May, with three light rains in June and one slight shower on July 9th. The heavy rains of August 5th and 8th were greatly needed, being the first rain of much consequence since the middle of May.

During parts of the summer months the weather continued very warm, but on the average was of exceptionally moderate temperature. During the latter part of June the thermometer, on various occasions, registered 80° in the shade; on July 9th it stood at 86°; and at 81° and 82° on the 21st and 22nd. On account of the dry weather, pasture was short, cereal crops did not seem to suffer as much on the Experimental Farm as in some other parts of the country, probably due to the underdrains. During the early part of the season the roots promised but a light crop, but after the August rains they made a rapid growth and a crop above the average was gathered.

HAY.

The hay was about an average crop on the upland, but not up to the average on the marsh lands. The lessened crop on the upland, as compared with 1894, was due to less acreage than formerly, the land being taken up with experimental plots and pasture. The timothy marsh gave a yield of seven loads less than the previous crop. The broad-leaf marsh was also five loads short. The yield of hay was as follows: Upland, 31 loads; marsh (timothy), 48; broad leaf marsh, 14 loads. Total yield, 93 loads or about 98 tons.

EXPERIMENTS WITH SPRING WHEAT.

The test plots of spring wheat which included thirty-three varieties, gave above the average yield of well-filled grain. Among the most promising of cross-bred sorts are: the Stanley, Preston, and Huron. The Stanley is particularly noticeable as a very desirable sort. The Red Fife, Red Fern, and Campbell's White Chaff are among the best of the older varieties. The straw was entirely free from rust, was bright and exceptionally stiff. The soil was a clayey loam, the previous crop being clover, the aftermath of which was ploughed under in the fall. The plots were one-twentieth acre each. The seed was sown on the 30th of April at the rate of 1½ bushels per acre, and the following results were obtained:—

WHEAT.—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of days Maturing	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
			n.		Inche		Bush. Lbs.	Lbs
Preston	Aug. 18	110	33	Stiff	2½ to 3½	Bearded..	32 ..	60
Stanley	do 21	113	38	do	3 to 3½	do ..	32 20	59
Major	do 22	114	36	do	2½ to 3	Beardless.	31 40	59
Campbell's White Chaff....	do 17	109	34	do	3 to 4	do ..	31 40	61
Herisson Bearded.....	do 23	115	36	do	1½ to 1¾	Bearded..	31. 20	63
Red Fern.....	do 18	110	32	Medium stiff....	3 to 3½	do ..	31 ..	61
Huron	do 20	112	35	Stiff	3 to 3½	do ..	31 ..	60
Admiral.....	do 22	114	36	Medium stiff....	2¾ to 3¼	Beardless.	30 40	62½
Golden Drop.....	do 17	109	32	Stiff	2¾ to 3	do ..	30 40	60
Old Red River.....	do 23	115	35	do	2½ to 3¼	do ..	30 20	61½
White Connell.....	do 22	114	35	do	3¼ to 4	do ..	29 20	62
Percy	do 18	110	33	do	2¾ to 3½	do ..	28 20	60
White Russian	do 23	115	35	do	3 to 4	do ..	28 ..	62
Goose	do 16	108	36	do	2 to 2½	Bearded..	27 40	61
Glengarry.....	do 26	118	37	do	3½ to 4	Beardless.	27 20	58
Captor	do 22	114	38	do	3 to 3½	do ..	27 ..	62
Blenheim.....	do 22	114	38	do	3 to 3½	Bearded..	27 ..	62
Advance	do 21	113	37	do	3 to 3½	do ..	26 20	62
Wellman's Fife	do 24	116	36	do	3½ to 4¼	Beardless.	25 20	60
Rideau.....	do 16	108	32	Medium stiff....	2½ to 3	do ..	25 20	60
Black Sea.....	do 16	108	34	Stiff	2¼ to 2¾	Bearded..	25 ..	59
Red Fife.....	do 22	114	33	do	2½ to 3	Beardless.	24 ..	59
Alpha	do 17	109	36	do	2½ to 2¾	do ..	24 ..	59½
Ladoga	do 16	108	35	do	2½ to 3	Bearded..	24 ..	60
White Fife.....	do 24	116	38	do	3 to 3½	Beardless.	23 40	62½
Rio Grande.. . . .	do 23	115	37	do	3½ to 5	Bearded..	22 40	62
Gehun	do 16	108	26	Medium stiff....	2¼ to 2¾	do ..	22 40	62
Crown	do 19	111	34	Stiff	3 to 3½	do ..	22 40	60½
Dion's.....	do 24	116	34	Medium stiff....	4 to 5	do ..	22 20	63
Abundance.....	do 15	107	35	Stiff	3¼ to 3¾	do ..	21 10	60
Beaudry.....	do 20	112	33	Medium stiff....	2 to 2¾	do ..	19 ..	58
Pringle's Champlain.....	do 21	113	35	Stiff	3 to 3¼	do ..	18 20	62
Colorado	do 22	114	32	do	3 to 3¼	do ..	17 ..	60

NOTE.—The weights per bushel given here, and also in all other grain tables in this report, were taken from the grain as it came from the threshing mill, and are not the maximum weights that the grain could be brought to by cleaning.

CROSS-BRED WHEATS.

Six varieties of cross-bred wheats produced at the Experimental Farms were sown on 1st May. The soil was a clayey loam. The previous crop being clover, the aftermath of which was plowed under in the fall of 1894. On these plots also the straw was entirely free from rust. The results were as follows:—

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
<i>Beauty.</i>			In.		Inches.		Bush. lbs.	Lbs
Red Fife female with No. 1 Club Bombay male	Aug. 21	113	37	Very stiff.	3 to 3½	Beardless.	30 ..	60
<i>Dufferin.</i>								
Anglo-Canadian female with Indian Karachi male	do 15	107	30	Stiff . . .	2½ to 2¾	Bearded ..	27 20	59
<i>Vernon.</i>								
Ladoga female with Early Sonora male	do 22	114	34	do	2½ to 3	do ..	27 20	62
<i>Progress.</i>								
Red Fife female with Ladoga male...	do 21	113	34	do	2½ to 3	Beardless.	27 ..	61
<i>Countess.</i>								
Early Sonora female with Red Fife male	do 22	114	32	do	2¼ to 3	do ..	23 20	61½
<i>Dawn.</i>								
Early Sonora female with Red Fife male	do 17	109	32	Medium stiff	2½ to 3	do ..	19 40	60

EXPERIMENTS WITH OATS.

Fifty-three varieties of oats were sown in plots of one-twentieth acre each. The straw was free from rust, but some of the heads of Doncaster Prize and Lincoln were smutted.

Those varieties, which have given the largest average yield for five consecutive years, have not yielded as heavily during the latter part of the period, as have some of the lately introduced sorts. Those which have given the best average results during the last four, as well as the last three years, are tabulated in the summary.

In the table giving results of the best averages for the five years, the Cream Egyptian heads the list as the best yielding white oat ; surpassed by the Black Tartarian, which, however, is four pounds lighter per bushel. The Egyptian is said to be one of the thickest hulled oats, which, if correct, must lessen its value.

The Joannette heads the list of the four years' test of varieties. This is a black oat which is said to have a very thin hull. It has also short straw and stools very freely, about 1½ bushels of seed per acre being sufficient to sow. In the three years' test, the Abyssinia white oat heads the list, this grain so far has proved to be a very fine variety.

The soil chosen for the test of varieties was a clayey loam, it was ploughed in the fall, and the previous crop was timothy and clover. A barrel of complete fertilizer was

used per acre. No rust was found this season on any of the varieties. The results are given in the following table :—

OATS—Test of Varieties.

Name of Variety.	Date of Sowing.		Date of Ripen- ing.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
					In.		In.		bus. lbs.	Lbs
Early Golden Prolific...	May	3.	Aug. 17.	106	36	Stiff.....	6 to 7	Branching...	72 12	39
Golden Beauty...	"	3.	" 16.	105	32	"	7	"	69 14	37
Early Gothland.....	"	3.	" 17.	106	38	"	7 to 8	Half sided....	66 16	40½
American Beauty.....	"	3.	" 18.	107	35	"	7 to 7½	Branching....	64 24	39
Cave	"	3.	" 19.	108	38	"	8 to 9	Sided.....	64 24	41½
Golden Giant.....	"	3.	" 27.	116	38	"	10 to 11	"	64 4	38
Giant Cluster... ..	"	3.	" 26.	115	40	"	9 to 10	"	63 18	34
Abyssinia	"	3.	" 15.	104	34	"	7 to 9	Half sided....	62 12	42
Early Blossom.....	"	3.	" 18.	107	32	"	8	Sided.....	62 12	38½
Bavarian.....	"	3.	" 16.	105	34	"	7 to 8	Branching....	60 20	39
White Russian	"	3.	" 14.	103	32	"	9	Half sided....	60	40½
Prolific Black California	"	3.	" 15.	104	36	"	8 to 9	Sided.....	59 14	37
Columbus.....	"	3.	" 15.	104	35	Medium..	6½ to 7	Branching....	59 14	37
Oderbruch.....	"	3.	" 14.	103	33	Stiff.....	7½ to 8	Half sided....	58 28	40
Imported Irish.....	"	3.	" 9.	98	36	"	8	Branching....	57 22	43½
Cream Egyptian.....	"	3.	" 14.	103	33	"	7½	Sided.....	57 2	41
Abundance.....	"	3.	" 18.	107	34	"	8 to 9	Branching....	56 16	37
Early English White.....	"	3.	" 10.	99	39	Medium..	11	"	55 30	43
Wallis	"	3.	" 17.	106	33	Stiff.....	6 to 7	"	54 24	39
Banner	"	3.	" 16.	105	34	"	8½	"	54 24	40
Improved Ligowo.....	"	3.	" 16.	105	34	"	8	"	54 24	36½
White Schonen.....	"	3.	" 15.	104	33	"	8	"	54 24	37
Holstein Prolific.....	"	3.	" 17.	106	35	Medium..	7 to 8	"	54 24	37½
Early Etampes.....	"	3.	" 15.	104	29	Stiff.....	6 to 7	"	54 4	36
Victoria Prize.....	"	3.	" 9.	98	36	"	11	"	52 32	41
Black Brie.....	"	3.	" 26.	115	32	" ..	8 to 9½	"	52 32	39½
Wide Awake.....	"	3.	" 14.	103	36	"	7 to 8	"	52 12	38
Joanette	"	3.	" 15.	104	28	"	6 to 7	"	52 12	37
Challenge	"	3.	" 8.	97	36	"	8½	"	51 16	42
White Wonder.....	"	3.	" 8.	97	36	Medium..	10	"	51 16	42
Poland White.....	"	3.	" 10.	99	36	"	9½	"	51 6	38
Scotch Hopetown.....	"	3.	" 24.	113	36	Stiff.....	10 to 11	"	51 6	40
Lincoln.....	"	3.	" 15.	104	33	Medium..	7½	"	50 20	36
New Electric.....	"	3.	" 24.	113	36	" ..	8 to 9½	Branching....	50 20	39
Early Maine.....	"	3.	" 26.	90	33	Stiff.....	7 to 8	Half sided....	50 ..	37
Hazlett's Seizure.	"	3.	" 8.	97	37	"	10	Branching....	49 14	41½
Rosedale.....	"	3.	" 15.	104	34	"	8	Half sided....	48 28	40
Prolific Black Tartarian.....	"	3.	" 19.	108	36	"	8	Sided.....	48 8	38
Welcome.....	"	3.	" 8.	97	38	"	9	Branching....	47 22	43
Early Racehorse.....	"	3.	" 10.	99	38	"	10	"	46 16	41
Canadian Triumph.....	"	3.	" 9.	98	37	Medium..	11½	"	45 30	43
Bonanza.....	"	3.	" 14.	103	32	" ..	8½	"	44 24	43
Coulommiers.....	"	3.	" 27.	116	33	Stiff.....	8½ to 9	"	44 4	39½
Early Archangel.....	"	3.	" 9.	98	38	Very stiff.	8	"	44 4	40½
Prize Cluster.....	"	3.	" 8.	97	36	Stiff.....	9	"	43 18	40½
Scottish Chief.....	"	3.	" 8.	97	36	Medium..	9	"	40 20	43
Siberian.....	"	3.	" 26.	115	38	Stiff.....	10	Sided.....	38 28	40
Doncaster Prize.	"	3.	" 17.	106	36	"	7 to 8	Branching....	38 8	42
Rennie's Prize White.....	"	3.	" 9.	98	36	"	9	"	37 22	40
Flying Scotchman	"	3.	" 10.	99	36	"	11½	"	36 16	42
American Triumph.....	"	3.	" 26.	115	42	"	10 to 11	"	36 16	40½
Winter Grey.....	"	3.	" 14.	103	33	"	8 to 9	"	32 12	42
White Monarch.....	"	3.	" 18.	107	36	"	9 to 10	"	31 26	41

SUMMARY.

The average yield of all these oat plots for the season 1895, has been 52 bushels 6 lbs. per acre.

The average yield per acre, from five years' experiments, of seven of the most promising varieties, has been as follows :

	Bush.	Lbs.	Weight per bush.
Prolific Black Tartarian.....	65	25	37
Cream Egyptian.....	64	25	41
Early Blossom.....	64	12	38½
Banner.....	61	17	40
Poland White.....	60	9	38
Victoria Prize.....	59	24	41
Race-horse.....	57	18	41

Average yield from four years' experiments, of three of the most promising varieties grown in the years 1892-3-4 and '5.

	Bush.	Lbs.	Weight per bush. lbs.
Joanette.....	60	2	37
Abundance.....	57	29	37
Early Gothland.....	55		40½

Average yield from three years' experiments, of three of the most promising varieties for the years 1893-4 and '5.

	Bush.	Lbs.	Weight per bu-h lbs.
Abyssinia.....	61	19	42
Oderbruch.....	60	20	40
Bavarian.....	59	24	39

EXPERIMENTS WITH BARLEY.

The experimental plots of barley consisted of thirty-seven varieties ; sixteen of six-rowed bearded sorts, eighteen of two-rowed ; and three of beardless six-rowed varieties.

The straw of all these was entirely free from rust, but Baxter's and Rennie's Improved were somewhat smutty. The grain was rather above the average, both as to yield and quality. From the summary of the results of the experiments conducted here during the past three years, it will be noticed that there is a slight difference in yield in favour of the six-rowed varieties ; but taking the average yield of seven of the most promising varieties of two-rowed and six-rowed for comparison, the advantage is slightly in favour of the two-rowed sorts. The six-rowed varieties prove to be somewhat earlier ; which is of considerable advantage if the season happens to be somewhat late, close observation has shown that in the majority of cases the six-rowed gives the most satisfactory results in the Maritime Provinces, although a larger yield of superior grain can often be had from a well cultivated field by sowing one of the best two-rowed sorts.

Among the most promising six-rowed varieties are some of the hybrid sorts produced at the Central Farm. Royal, Trooper, Surprise and Summit taking the lead since they were introduced two years ago. Among the older favourites Oderbruch takes a leading place ; of the two-rowed sorts, the Canadian Thorpe, closely followed by the Kinver Chevalier. The first named variety has been more productive and thrifty than either the Duck-bill or Goldthorpe, which it closely resembles. Two of the hybrid two-rowed sorts produced at the Central Farm, viz., Bolton and Sidney, have also given good results.

Very promising results were obtained from the new beardless varieties sown this year for the first time. The soil chosen for the test of varieties was a rather light loam. The land had been in pasture for several years, was ploughed in the spring, and one

barrel of complete fertilizer used per acre. The seed was sown at the rate of two bushels per acre. The following table gives the results :—

SIX-ROWED BARLEY—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.		Date of Ripening.		Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.
						In.		Inches.	Bus.	lbs.	Lbs.
Odessa	May	2..	Aug.	2..	92	28	Stiff	2½ to 3	52	4	50
Royal	"	2..	"	2..	92	28	Medium	2½ to 3	45	20	51
Mensury	"	2..	"	3..	93	34	Stiff	2 to 2¾	44	28	51
Trooper	"	2..	"	9..	99	34	Medium	2 to 2¾	43	16	50
Pioneer	"	2..	"	3..	93	36	Weak	2¼ to 2½	42	24	54
Common	"	2..	"	2..	92	32	"	2 to 2½	42	4	52
Surprise	"	2..	"	13..	103	36	Stiff	1¾ to 2	41	32	50
Phoenix	"	2..	"	3..	93	34	"	2½ to 2¾	41	.	51
Vanguard	"	2..	"	3..	93	32	"	2½ to 3	40	20	50½
Oderbruch	"	2..	"	3..	93	27	"	2 to 2½	38	16	48½
Petschora	"	2..	"	2..	92	30	Medium	2½ to 3¼	37	44	50½
Stella	"	2..	"	13..	103	36	"	2½ to 2¾	34	28	51
Summit	"	2..	"	13..	103	34	"	2¼ to 2½	34	8	51
Baxter's	"	2..	"	4..	94	28	Stiff	1¾ to 2¼	34	8	53
Rennie's Improved	"	2..	"	4..	94	28	"	1¾ to 2	32	44	51½
Nugent	"	2..	"	9..	99	33	Very stiff	2 to 2¼	31	32	49

TWO-ROWED BARLEY—TEST OF VARIETIES.

French Chevalier	May	2..	Aug.	14..	104	29	Medium	2¾ to 3¼	47	44	52
Canadian Thorpe	"	2..	"	13..	103	33	Stiff	3 to 3¼	46	32	52
New Golden Grains	"	2..	"	13..	103	29	Weak	3 to 3½	44	28	50½
Danish Chevalier	"	2..	"	14..	104	28	"	3½ to 4	42	24	53
Prize Prolific	"	2..	"	15..	105	31	Very weak	3½ to 4	38	16	51
Kinver Chevalier	"	2..	"	18..	108	30	Weak	3 to 3¾	37	4	53
Newton	"	2..	"	14..	104	32	Stiff	2½ to 3	35	20	52
Thanet	"	2..	"	16..	106	26	Medium	2½ to 4	35	20	51½
Bolton	"	2..	"	7..	97	32	"	2½ to 3½	34	8	52
Golden Melon	"	2..	"	19..	109	32	Stiff	2½ to 4	32	4	53
Monck	"	2..	"	16..	106	42	"	3 to 3½	30	40	52
Duck-bill	"	2..	"	14..	104	32	"	2½ to 3	30	20	54
Victor	"	2..	"	15..	105	32	"	2½ to 3¼	30	.	55
California Prolific	"	2..	"	15..	105	35	Very stiff	3 to 3½	29	8	52
Two-rowed Naked	"	2..	"	16..	106	30	Medium	3 to 3¾	28	36	65
Sidney	"	2..	"	15..	105	30	Stiff	3½ to 4	27	40	54
Beaver	"	2..	"	16..	106	27	Medium	2½ to 3	27	24	52
Rigid	"	2..	"	16..	106	38	Stiff	2¼ to 2¾	22	44	52

BEARDLESS BARLEY—TEST OF VARIETIES.

Success	May	2..	Aug.	2..	92	34	Medium	2½ to 3¼	45	40	48
Excelsior	"	2..	"	2..	92	36	Weak	2½ to 3½	45	.	45
Champion	"	2..	"	3..	93	36	Stiff	2¾ to 3¼	42	20	46

	Bush.	Lbs.
Average yield of all the six-rowed varieties for 1895	39	38
Average yield of all the two-rowed sorts for 1895	38	30

SUMMARY.

Best average yields from experiments conducted with six-rowed varieties of barley for the past four years—

	Bush.	Lbs.
Oderbruch.....	37	9
Baxter's.....	35	5
Rennie's Improved.....	32	6

Best average yields from six-rowed varieties for the past two seasons—

	Bush.	Lbs.
Royal	41	22
Trooper	34	38
Surprise.....	33	26
Summit	31	22

Average yield per acre of the above seven promising six-rowed varieties—

Bush.	Lbs.
35	4

Best average yield from experiments conducted with two-rowed varieties of barley for the past four years—

	Bush.	Lbs.
New Golden Grains.....	35	42
Duckbill.....	34	2
French Chevalier.....	33	41

Best average yields from two-rowed varieties for the past two seasons—

	Bush.	Lbs.
Canadian Thorpe.....	37	44
Kinver Chevalier.....	37	42
Bolton.....	34	38
Sidney.....	34	22

Average yield per acre of the above seven promising two-rowed varieties—

Bush.	Lbs.
35	45

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS OF GRAIN.

Experiments to test the relative advantages of early, medium and late sowing were again carried on this year. From the results of five years' tests, it will be seen that with oats the third and fourth sowings have given the largest crops followed by the second and first. With barley the advantage has been with the third, second and fourth sowings, and with wheat the second and third sowings have given the largest returns.

The first of these plots was sown April 30, the size was one-twentieth of an acre, the soil sandy loam, and the previous crop was corn, one week intervening between each

of the six sowings. No rust was observed on any of the plots. There were two plots each of wheat, barley and oats in each series. The following results were obtained :—

OATS—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per bushel.
				In.		In.		Bus. lbs.	Lbs
No. 1— Banner	April 30..	Aug. 5..	97	34	Stiff	8	Branching..	42 2	36
Abundance.....	" 30..	" 5..	97	31	"	7	" ..	44 24	37
No. 2— Banner	May 7..	" 7..	92	38	"	8½	" ..	42 2	36
Abundance.....	" 7..	" 7..	92	36	"	7½	" ..	54 24	38
No. 3— Banner	" 14..	" 16..	91	39	"	8	" ..	50 ..	39
Abundance.....	" 14..	" 16..	91	36	"	7	" ..	67 22	38½
No. 4— Banner	" 21..	" 22..	93	36	"	8	" ..	54 24	37
Abundance.....	" 21..	" 22..	93	36	"	7	" ..	56 16	38
No. 5— Banner	" 28..	" 27..	91	30	"	7	" ..	50 ..	37
Abundance.....	" 28..	" 27..	91	30	"	6	" ..	42 12	38
No. 6— Banner	June 4..	Sept. 5..	93	32	"	7	" ..	52 32	37
Abundance.....	" 4..	" 5..	93	32	"	7	" ..	48 8	37

BARLEY—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				In.		In.		Bus. lbs.	Lbs
No. 1— Canadian Thorpe.....	April 30..	Aug. 1..	93	27	Stiff ...	2½ to 2¾	Two-rowed .	18 36	50½
Oderbruch.....	" 30..	July 24..	85	31	" ...	2	Six-rowed ..	25 ..	50
No. 2— Canadian Thorpe.....	May 7..	Aug. 3..	88	27	" ...	2½ to 2¾	Two-rowed .	19 28	49
Oderbruch.....	" 7..	July 30..	84	30	" ...	2 to 2¼	Six-rowed ..	32 14	50
No. 3— Canadian Thorpe.....	" 14..	Aug. 12..	90	25	" ...	2¼ to 2¾	Two-rowed .	23 16	49
Oderbruch.....	" 14..	" 5..	83	29	" ...	2¼	Six-rowed ..	32 24	49
No. 4— Canadian Thorpe.....	" 21..	" 17..	88	24	" ...	2 to 2½	Two-rowed .	22 24	48
Oderbruch.....	" 21..	" 8..	78	26	" ...	2 to 2¼	Six-rowed ..	33 36	48
No. 5— Canadian Thorpe.....	" 28..	" 22..	86	24	" ...	2½ to 2¾	Two-rowed .	27 4	49
Oderbruch.....	" 28..	" 13..	77	26	" ...	2 to 2¼	Six-rowed ..	22 4	48½
No. 6— Canadian Thorpe.....	June 4..	" 31..	88	24	" ...	2½ to 3	Two-rowed .	23 16	49
Oderbruch.....	" 4..	" 22..	79	24	" ...	2	Six-rowed ..	21 32	48

WHEAT—EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				In.		In.		Bus. lbs.	Lbs
No. 1—									
Red Fife.....	April 30..	Aug. 17..	109	31	Stiff ...	2 $\frac{3}{4}$ to 3 $\frac{1}{2}$	Beardless...	14 20	61
Stanley.....	" 30..	" 15..	107	34	" ...	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$	" ..	19 20	59
No. 2—									
Red Fife.....	May 7..	" 19..	104	32	" ...	2 $\frac{1}{2}$ to 3 $\frac{1}{4}$	" ..	11 20	60
Stanley.....	" 7..	" 17..	102	38	" ...	2 $\frac{1}{2}$ to 3	" ..	26 40	59
No. 3—									
Red Fife.....	" 14..	" 24..	99	36	" ...	3 $\frac{1}{4}$ to 3 $\frac{3}{4}$	" ..	12 ..	60
Stanley.....	" 14..	" 22..	97	37	" ...	2 $\frac{1}{2}$ to 3	" ..	25 20	61
No. 4—									
Red Fife.....	" 21..	" 31..	102	29	" ...	3 to 3 $\frac{3}{4}$	" ..	16 ..	57
Stanley .. .	" 21..	" 30..	101	32	" ...	2 $\frac{1}{2}$ to 3	" ..	15 ..	57
No. 5—									
Red Fife... ..	" 28..	Sept. 8..	103	30	" ...	3 to 3 $\frac{1}{2}$	" ..	15 ..	58
Stanley.....	" 28..	" 5..	100	31	" ...	3 to 3 $\frac{1}{2}$	" ..	20 ..	59
No. 6—									
Red Fife.....	June 4..	" 8..	96	34	" ...	3 $\frac{1}{4}$ to 3 $\frac{1}{2}$	" ..	15 40	56
Stanley	" 4..	" 8..	96	35	" ...	3 to 3 $\frac{1}{2}$	" ..	19 ..	55

SUMMARY.

Results for the period of five years' tests of early medium and late sowing of all varieties :—

OATS.

	Bush.	Lbs.
1st sowing, average of ten tests.....	45	16
2nd " " " "	48	22
3rd " " " "	55	25
4th " " " "	50	30
5th " " eight "	43	32
6th " " " "	43	33

BARLEY.

	Bush.	Lbs.
1st sowing, average of ten tests.....	25	38
2nd " " " "	27	57
3rd " " " "	29	42
4th " " " "	27	44
5th " " eight "	25	19
6th " " " "	22	42

WHEAT.

	Bush.	Lbs.
1st sowing, average of ten tests.....	18	38
2nd " " " "	20	34
3rd " " " "	19	33
4th " " " "	15	51
5th " " eight "	18	25
6th " " six "	17	39

The average of all the sowings of all the varieties for the period of five years is as follows :—

	Yield per acre.	
Oats (56 sowings).....	48 bush.	4 lbs.
Barley (56 sowings).....	26 “	32 “
Wheat (54 sowings).....	18 “	27 “

GRAIN SOWN ON LAND MANURED WITH DIFFERENT QUANTITIES OF MANURE PER ACRE.

The land on which this grain was sown was in turnips last season, being manured for that crop with 20, 30 and 40 30-bushel cart loads of manure per acre. The results then obtained are given in last year's report. This land was sown this season with mixed grain, made up as follows : Wheat, $\frac{1}{2}$ bush. ; oats, $1\frac{3}{4}$ bush. ; pease, $\frac{1}{2}$ bush.; total, $2\frac{3}{4}$ bush. per acre. Sown on 4th May, harvested on August 6th, the following results were obtained : The first plot, manured with 20 loads per acre, yielded 30 bush. of mixed grain per acre, weighing 43 lbs. per bush. ; straw, medium heavy. The second plot, which had received 30 loads of manure per acre, yielded 34 bushels of grain per acre, with a weight of 41 lbs. per bush., straw heavy.

The third plot, with 40 loads of manure per acre, yielded 32 bushels of grain per acre, weighing 44 lbs. per bushel, straw very heavy.

FIELD LOTS OF GRAIN.

Name of Variety.	Character of Straw.	Yield per Acre.		Weight per Bushel.
		Bus.	Lbs.	Lbs.
Cream Egyptian	Stiff	52	21	$41\frac{1}{2}$
Rosedale.....	Stiff	48	8	$41\frac{1}{2}$
Winter Grey.....	Medium..	39	8	$38\frac{1}{2}$
Oderbruch.....	Stiff	38		40

The other lots of grain gave a yield as follows :—from the marsh 248 bushels, upland 265 bushels with 40 bushels of buckwheat.

FIELD PEASE.

Ten varieties of field pease were sown May 2nd, on one-twentieth acre plots ; the soil was a light loam. This land had been in pasture for several seasons and was ploughed in the spring, and one barrel of complete fertilizer used per acre, with the following results.

PEASE—TEST OF VARIETIES,

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.	Remarks.
					In.	In.		Bush. Lbs.	Lbs.	
Crown, 7½ lbs. or 2½ bush. per acre.....	May 2.	Aug. 6.	96	Strong..	38	1¾ to 2	Small..	55 ..	62	Stiff.
Black-eyed Marrowfat, 10½ lbs. or 3½ bush. per acre...	" 2.	" 23.	113	do ..	39	2½ to 3	Large ..	53 20	59½	"
Canadian Beauty, 10 lbs. or 3½ bush per acre.....	" 2.	" 20.	110	do ..	36	2 to 2½	do ..	47 40	60	"
Potter, 7½ lbs. or 2½ bush. per acre	" 2.	" 14.	104	do ..	38	2 to 2½	Small...	47 20	59	"
Pride, 9 lbs. or 3 bush per acre	" 2.	" 6.	95	do ..	39	2 to 2½	Medium	43 40	62½	Medium
Centennial, 9 lbs. or 3 bush. per acre.	" 2.	" 7.	97	do ..	40	2¼ to 2¾	do ..	42 40	60	"
Prince Albert, 7½ lbs. or 2½ bush. per acre.....	" 2.	" 18.	108	do ..	37	2¼ to 2½	Small ..	42 20	60½	Stiff.
Multiplier, 7½ lbs. or 2½ bush. per acre.....	" 2.	" 20.	110	do ..	37	2 to 2½	do ..	41 40	60½	"
Golden Vine, 7½ lbs. or 2½ bush. per acre.....	" 2.	" 7.	97	do ..	34	1¾ to 2	do ..	41 ..	62	"
Mummy, 9 lbs. or 3 bush. per acre.....	" 2.	" 13.	103	do ..	38	2 to 2½	Medium	40 ..	60½	Medium

SUMMARY.

Average yield of pease per acre, from three years' tests of seven of the most promising varieties :—

	Bush.	Lbs.
Black Eyed Marrowfat.....	47	13
Canadian Beauty.....	42	
Multiplier.....	41	17
Prince Albert.....	41	16
Crown.....	40	
Pride.....	39	
Golden Vine.....	39	

RYE.

A plot of winter rye was sown on September 11, 1894. This made a very strong growth of stout, bright straw, and gave a heavy yield. Harvested July 30.

TURNIPS.—TEST OF VARIETIES.

The land used for these experiments was a clay loam, the previous crop was oats. It was ploughed in the fall of 1894, and thirty 30 bushel cart loads of manure, well rotted, was used per acre, which was ploughed under in the spring. The first set of plots

were sown on the 25th of May. The second on the 8th of June. The yield of all roots per acre has been calculated from the quantity obtained from three rows, each 66 feet long and 28 inches apart. All the varieties made a strong and healthy growth. The following results were obtained :—

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
					Tons. lbs.	Bus. lbs.	Tons. lbs.	Bus. lbs.	Tons. lbs.	Bus. lbs.	Tons. lbs.	Bus. lbs.
Lord Derby.	May 25.	June 8.	Oct. 21.	Oct. 21.	35 1250	1187 30	31 700	1045 ..				
Purple Top Swede.	" 25.	" 8.	" 21.	" 21.	34 1825	1163 45	29 1375	989 35				
Elephant's Master.	" 25.	" 8.	" 21.	" 21.	33 975	1116 15	28 1000	950 ..				
East Lothian.	" 25.	" 8.	" 21.	" 21.	33 975	1116 15	28 1470	957 50				
Skirving's Swede.	" 25.	" 8.	" 21.	" 21.	33 500	1108 20	26 725	878 45				
Prize Purple Top.	" 25.	" 8.	" 21.	" 21.	33 500	1108 20	24 1870	831 10				
Hartley's Bronze.	" 25.	" 8.	" 21.	" 21.	30 800	1013 20	41 1125	1385 25				
Giant King.	" 25.	" 8.	" 21.	" 21.	30 325	1005 25	23 740	779 ..				
Imperial Swede.	" 25.	" 8.	" 21.	" 21.	28 1950	965 50	26 725	878 45				
Champion Purple Top.	" 25.	" 8.	" 21.	" 21.	28 1950	965 50	36 200	1203 20				
Carter's Elephant Swede.	" 25.	" 8.	" 21.	" 21.	28 1000	950 ..	30 800	1013 20				
Jumbo, or Monarch.	" 25.	" 8.	" 21.	" 21.	28 525	942 5	33 1450	1124 10				

TURNIPS.

General average for two sowings per acre.

	bush.	lbs.
No. 1. Sowing of 25th May, 1895.	1053	10
No. 2. " " 8th June, 1895.	1003	11

SUMMARY.

Average yield for five years sowing per acre.

Name of Variety.	Plots No. 1.		Plots No. 2.	
	Bush.	Lbs.	Bush.	Lbs.
Purple Top Swede.	915	35	853	31
Jumbo or Monarch Swede.	868	14	833	23
Prize Purple Top Swede.	820	49	681	59
Skirving's Swede.	799	7	961	30
Carter's Elephant Swede.	767	41	738	43

Average yield of plots No. 1 for five years test, 834 bush. 17 lbs.

Average yield of plots No. 2 sown two weeks later for five years, 813 bush. 49 lbs.

MANGELS, TEST OF VARIETIES.

The mangel plots were sown on similar soil; which had the same treatment and manuring as those for turnips. The Giant Yellow Intermediate has given the largest returns for the period of five years test, followed by the Mammoth Long Red. The following are the results obtained during the past season when all the varieties made a strong growth.

MANGELS.—TEST OF VARIETIES.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.	Yield per Acre, 1st Plot.	Yield per Acre, 2nd Plot.	Yield per Acre, 2nd Plot.
					Tons. lbs.	Bush. lbs.	Tons. lbs.	Bush. lbs.
Giant Yellow Interme- diate.....	May 25.	June 8.	Oct. 19.	Oct. 19.	35 965	1,182 45	29 1,850	997 30
Golden Tankard.....	do 25.	do 8.	do 19.	do 19.	32 790	1,079 50	30 800	1,013 40
Dairy Farmer.....	do 25.	do 8.	do 19.	do 19.	27 1,100	818 20	23 1,500	791 40
Red Fleshed Tankard...	do 25.	do 8.	do 19.	do 19.	24 165	802 45	15 875	514 35
Gate Post.....	do 25.	do 8.	do 19.	do 19.	22 175	736 15	21 1,600	726 40
Evan's Mammoth Long Red.....	do 25.	do 8.	do 19.	do 19.	21 1,700	728 20	20 1,800	696 40
Conqueror Yellow Globe.	do 25.	do 8.	do 19.	do 19.	21 1,415	723 35	17 1,150	585 50
Webb's Mammoth Long Red.....	do 25.	do 8.	do 19.	do 19.	19 950	649 10	24 450	807 30
Warden Prize Orange Globe.....	do 25.	do 8.	do 19.	do 19.	19 475	641 15	16 15	533 35
Champion Yellow Globe.	do 25.	do 8.	do 19.	do 19.	17 1,625	593 45	23 1,975	799 35
Sharpe's Mammoth Long Red.....	do 25.	do 8.	do 19.	do 19.	16 775	546 15	23 75	767 45
Red Globe.....	do 25.	do 8.	do 19.	do 19.	10 1,375	356 15	15 400	506 40

MANGELS.—General average for two sowings per acre :—

	Bush.	Lbs.
No. 1 Sowing of May 25, 1895.....	738	12
No. 2 " June 8, 1895.....	728	28

SUMMARY.

Average yield per acre for five years' sowing :—

Name of Variety.	Plot No. 1.		Plot No. 2.	
	Bush.	Lbs.	Bush.	Lbs.
Giant Yellow Intermediate.....	860	6	819	43
Mammoth Long Red.....	790	48	742	36
Golden Tankard.....	739	27	658	14
Gate Post.....	723	30	728	9
Yellow Globe.....	646	2	669	33

Average yield of plots No. 1 for five years 751 bushels, 58 lbs.

Average yield of plots No. 2 for five years 723 bushels, 39 lbs.

CARROTS.—Test of Varieties.

The carrot plots were on land similar to that of the turnip plots ; and received the same cultivation and manuring. It will be noticed that, while on the average the difference is not very large between the early and late sown plots of turnips and mangels, there is a very marked difference in the carrot plots in favour of early sowing.

Name of Variety.	Character of Growth.	1st Plot Sown.		2nd Plot Sown.		1st Plot Pulled.		2nd Plot Pulled.		Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
										Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
Improved Short White	Strong..	May 25	June 8	Oct. 21	Oct. 21	24	1,400	823	20	9	525	308	45				
Mam. White Intermediate...	do ..	do 25	do 8	do 21	do 21	21	275	704	35	13	1,550	159	10				
Iverson's Champion	do ..	do 25	do 8	do 21	do 21	20	1,800	696	40	15	1,825	530	25				
Carter's Orange Giant.....	do ..	do 25	do 8	do 21	do 21	20	565	676	5	8	150	268	10				
Improved Half-Long White.....	do ..	do 25	do 8	do 21	do 21	19	950	649	10	15	1,825	530	25				
Early Gem.....	do ..	do 25	do 8	do 21	do 21	19	190	636	30	6	1,775	229	35				
Yellow Intermediate	Fair....	do 25	do 8	do 21	do 21	18	1,050	617	30	9	1,950	332	30				
Long Scarlet Alt- ringham	Poor...	do 25	do 8	do 21	do 21	14	1,925	498	45	5	450	174	10				
White Belgian	Fair....	do 25	do 8	do 21	do 21	13	125	435	25	10	425	340	25				
Scarlet Intermediate.....	do ...	do 25	do 8	do 21	do 21	11	1,275	387	55	11	1,275	387	55				
Long Orange, or Surrey.....	Poor...	do 25	do 8	do 21	do 21	11	325	372	5	5	450	174	10				
Giant Short White Vosges.....	Fair....	do 25	do 8	do 21	do 21	8	1,765	296	5	14	975	482	55				

CARROTS.—General average for two sowings—per acre :—

	Bushels.	Lbs.
No. 1 Sowing of May 25, 1895.....	566	3
No. 2 " June 8, 1895	351	5

SUMMARY.

Average yield per acre, for five years :—

Name of Variety.	Plot. No. 1.		Plot. No. 2.	
	Bush.	Lbs.	Bush.	Lbs.
White Intermediate.....	851	38	516	11
Improved Short White.....	814	2	496	33
Early Gem	695	52	386	18
Guerande or Oxheart.....	680	35	405	1
Carter's Orange Giant.....	580	8	380	21
White Belgian	550	41	363	26

Average yield of plots No. 1 for five years 695 bushels, 29 lbs.
Average yield of plots No. 2 for five years 424 bushels, 38 lbs.

SUGAR BEETS.

Five varieties of sugar beets were sown on May 25th. These were pulled on October 24th. The soil was of a sandy loam ; a complete fertilizer, at the rate of six hundred pounds per acre being used. The following results were obtained :—

Name of Variety.	Yield per Acre.			
	Tons.	Lbs.	Bush.	Lbs.
Austrian Electoral.....	19	250	637	30
German White.....	17	1,250	587	30
White French.....	14	1,775	496	15
Klein Wanzleben.....	13	250	437	30
Vilmorin's Improved.....	12	975	416	15

FIELD CROPS OF ROOTS.

In addition to the root plots already referred to ; four acres of turnips gave a yield of 982 bushels per acre. One-half acre of mangels gave a yield of 800 bushels per acre. A plot of Steele's Improved Short White carrots which were sown on the same date as the mangels June 9th, and pulled October 25th, gave a yield of 725 bushels per acre.

EXPERIMENTS WITH POTATOES.

CUTTING SEED POTATOES FOR PLANTING.

Potatoes for seed were cut in eight different ways and planted. It seems evident from the experiments conducted along this line at Nappan that it pays to use large tubers for seed rather than small ones and that care should be taken in cutting potatoes that they are not cut too small. It will require more seed per acre to make large cuts, yet the extra yield would more than pay the difference in the value of the seed used. The following results were obtained :—

Name of Variety.	Yield per Acre.			
	Marketable.		Unmarketable.	
	Bush.	Lbs.	Bush.	Lbs.
Whole.....	320	..	40	..
One eye.....	180	..	20	..
Two eyes.....	255	..	40	..
Three eyes.....	310	..	30	..
Butt end.....	307	30	55	..
Seed end.....	312	30	35	..
Cut lengthwise.....	307	30	35	..
Seed end cut off.....	310	..	57	30

POTATOES PLANTED WITH AND WITHOUT FERTILIZER.

These plots were on a rather light loam which was ploughed in the fall of 1894, being in timothy and clover that year. Six hundred pounds of potato fertilizer was used per acre, sown broadcast, without other manure. The other plot received neither fertilizer nor manure.

EXPERIMENTAL FARMS.

WITH FERTILIZER, PER ACRE.

	Marketable.	Unmarketable.
Clarke's No. 1.....	362.40 bush.....	26.40 bush.
Pearce's Prize Winner	415.00 "	55.00 "

WITHOUT FERTILIZER PER ACRE.

	Marketable.	Unmarketable.
Clarke's No. 1.....	240 bush.....	31.40 bush.
Pearce's Prize Winner.....	282.30 "	52.30 "

BORDEAUX MIXTURE FOR THE PREVENTION OF POTATO ROT.

Three plots were used to ascertain the effects of Bordeaux mixture as a preventive of potato rot. The first application was made on August 1st, and the second two weeks later. The soil selected was of a uniform character, yet there appeared to be a difference in yield in favour of the plots on which the Bordeaux mixture was used. No rotten potatoes were found in any of the plots. The results obtained were as follows :—

BORDEAUX MIXTURE APPLIED.

	Marketable. Per acre.	Unmarketable. Per acre.
World's Fair.....	177 bush.....	28 bush.
Pearce's Prize Winner.....	167 "	26 "
Clarke's No. 1.....	138 "	16 "

NO BORDEAUX MIXTURE USED.

	Marketable. Per acre.	Unmarketable. Per acre.
World's Fair.....	161 bush.....	11 bush.
Pearce's Prize Winner.....	152 "	25 "
Clarke's No. 1.....	93 "	8 "

POTATOES, TEST OF VARIETIES.

Eighty-five varieties of potatoes were planted on a light loamy soil, which had been in meadow the previous season, it was ploughed in the fall of 1894. Not having sufficient barn-yard manure, six hundred pounds of potato fertilizer was used per acre, sown broadcast. All the plots were treated with the Bordeaux mixture, and no rotten ones were found.

Among the most promising varieties are: Early Sunrise, Pearce's Extra Early, Early Gem, Clarke's No. 1, I. X. L., Late Puritan, Delaware, State of Maine and Pearce's Prize Winner. The following results were obtained.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Planted.	Dug.	When matured.	Average size.	Quality.	Total yield per acre.	Yield per acre of market- able.	Yield per acre of unmar- ketable.	Form and colour.
Pearce's Prize Winner.....	May 23..	Sept. 24..	Late	Medium....	Good.....	Bush. 375	Bush. 352	Bush. 22	Oblong, white.
Wonderful Clay Rose.....	" 23..	" 24..	"	"	"	360	340	20	Roundish, pink.
Richter's Rose.....	" 23..	" 24..	Medium late.....	"	Good.....	350	330	20	Oblong, white.
Holborn Abundance.....	" 23..	" 25..	Late	Large	"	350	315	35	Long round, white.
Carman's No. 1.....	" 23..	" 24..	Medium late.....	Medium....	"	345	325	20	Long round, white.
Empire State.....	" 23..	" 24..	Late	Large	"	340	302	30	Round, white.
American Wonder.....	" 23..	" 25..	"	"	"	340	312	30	Elongated, white.
Dreer's Standard.....	" 23..	" 24..	Medium early.....	"	"	340	302	30	Long round, white.
Clarke's No. 1	" 23..	" 24..	Medium late.....	"	"	336	315	21	Long round, white.
Richter's Elephant.....	" 23..	" 24..	Early	Medium....	"	330	280	50	Round, white and pink.
Early Harvest.....	" 23..	" 25..	Medium late.....	"	"	325	295	30	Long round, pinkish.
Irish Daisy.....	" 23..	" 24..	"	"	"	320	270	55	Round, white.
Brownell's Winner.....	" 23..	" 25..	Late	Large	Fair.....	320	305	15	Roundish, white.
Late Puritan.....	" 23..	" 24..	"	Medium....	Good.....	320	305	15	Oblong, red.
Peerless Junior.....	" 23..	" 24..	"	Large	"	320	305	15	Long round, white.
Home Comfort.....	" 23..	" 24..	Medium early.....	"	"	307	285	22	Round flat, white.
New Variety No. 1.....	" 23..	" 24..	Medium late.....	Medium....	"	307	285	22	Oblong, light and pink.
Rural New Yorker No. 2.....	" 23..	" 25..	"	"	"	306	301	5	Round, pinkish white.
Dixon's Early.....	" 23..	" 24..	Medium early.....	"	"	302	267	35	Oblong roundish, white.
Pride of the Table.....	" 23..	" 24..	"	"	"	302	272	30	Oval, pink and white.
A. Abbot.....	" 23..	" 24..	Medium late.....	"	"	300	280	20	Round, red.
Delaware.....	" 23..	" 24..	Late	Large	"	300	275	25	Long round, pink.
Chicago Market.....	" 23..	" 25..	Medium late.....	Medium....	"	300	257	42	Round, white.
Polaris.....	" 23..	" 25..	"	"	"	300	255	45	Oval, white.
Bruce's White Beauty.....	" 23..	" 24..	Medium early.....	"	"	300	260	40	Oblong, white.
State of Maine.....	" 23..	" 24..	Late	"	"	300	275	25	Oblong, white.
Munro County.....	" 23..	" 25..	Medium late.....	"	"	297	265	30	Long round, light red.
Dakota Red	" 23..	" 24..	Medium early.....	Large	Fair.....	295	262	32	Round, red.
Muchonic	" 23..	" 25..	"	Medium....	"	292	267	25	Round, blue and white.
Bent's Late	" 23..	" 24..	"	Large	"	290	265	25	Roundish, white.
Kidney	" 23..	" 24..	Medium early.....	Medium....	Good.....	287	275	12	Long, blue.
Richter's Schneerose	" 23..	" 25..	Late	"	Fair.....	285	252	32	Round, white.
Earliest of All.....	" 23..	" 25..	Early	"	Good.....	285	250	35	Oval, white and pink.
Copper.....	" 23..	" 24..	Late	"	"	285	230	55	Round, blue.

POTATOES—TEST OF VARIETIES—Continued.

Name of Variety.	Planted.	Dug.	When Matured.	Average Size.	Quality.	Total yield per acre.	Yield per acre of market-able.	Yield per acre of unmarket-able.	Form and colour
Jerusalem.....	May 23..	Sept. 24..	Late.....	Medium.....	Good.....	Bush. 283	Bush. 275	Lbs. 30	Round, red.
Troy Seedling	" 23..	" 24..	"	Large.....	"	282	262	30	Round, white.
I. X. L.	" 23..	" 25..	"	"	"	282	265	30	Oblong, white and pink.
Early Ohio.....	" 23..	" 25..	Early	Medium.....	"	280	245	35	Oval, light pink.
Lee's Favourite.....	" 23..	" 24..	"	"	"	280	250	30	Round, pink and white.
Burbank.....	" 23..	" 24..	Medium late.....	"	"	280	265	15	Oblong, white.
Rose's New Giant.	" 23..	" 25..	"	"	Fair.....	277	262	30	Long, round, white.
Pride of the Market.	" 23..	" 25..	Medium early.....	Large.....	Good.....	275	250	25	Long, flat, white.
Lightning Express.....	" 23..	" 24..	Medium late.....	"	"	275	260	15	Round, pink.
Northern Spy.....	" 23..	" 25..	Late	Medium.....	Good.....	272	255	17	Round, red.
Crown Jewel.....	" 23..	" 25..	Early	"	"	272	222	50	Oval, white.
Rosy Morn.....	" 23..	" 24..	Medium late.....	"	Fair.....	272	225	47	Round, pinkish.
Richter's Imperial	" 23..	" 24..	"	"	Good.....	268	225	43	Round, white.
Beauty of Hebron.....	" 23..	" 24..	Medium early.....	"	"	267	225	42	Oblong, white and pink.
Acadian.....	" 23..	" 24..	Medium late.....	"	"	265	240	25	Round, blue.
Compton's Surprise	" 23..	" 25..	Late.....	"	"	262	240	22	Round, white.
Everett.....	" 23..	" 25..	Medium early.....	"	Fair.....	260	215	45	Oval, pink.
Harbinger.....	" 23..	" 25..	"	"	Good.....	260	210	50	Round, light pink.
Early Gen.....	" 23..	" 24..	Very early.....	"	"	260	225	35	Oval, pink.
Early Rose.....	" 23..	" 24..	Early.....	"	"	260	225	35	Oblong, pink.
Early Northern.....	" 23..	" 24..	Medium early.....	Large.....	"	260	215	45	Round, light red.
Money-maker.....	" 23..	" 25..	Medium late.....	Medium.....	"	260	230	30	Long, smooth, white.
Early White Prize.....	" 23..	" 24..	Early	"	"	255	220	35	Round, white.
New Queen.....	" 23..	" 24..	Medium early.....	"	"	250	220	30	Long, round, white.
Victor Rose.....	" 23..	" 24..	Late.....	"	"	250	235	15	Round, pink.
Sharpe's Seedling.....	" 23..	" 25..	Medium early.....	"	Good.....	250	205	45	Round, pale pink.
Late Goodrich.....	" 23..	" 25..	Late	Large.....	Fair.....	247	222	30	Round, white.
Burpee's Extra Early.....	" 23..	" 25..	Very early.....	Medium.....	Good.....	247	212	30	Oblong, whitish pink.
Henderson's Late Puritan.....	" 23..	" 24..	Late.....	Large.....	"	247	230	17	Roundish, white.
Wonder of the World.....	" 23..	" 24..	Medium late.....	Medium.....	"	237	207	30	Roundish, white.
London.....	" 23..	" 25..	"	"	Fair.....	235	202	30	Oval, pink.
Early Sunrise.....	" 23..	" 25..	Very early.....	"	Good.....	230	177	30	Oblong, pink.
Sugar	" 23..	" 24..	Medium late.....	Small	"	225	190	35	Round, white.
Great Divide.....	" 23..	" 24..	Early	Medium.....	"	225	210	15	Long, round, white.

Pope.....	"	23..	"	24..	Late .....	"	.....	Good.....	225	208	17	Roundish, red and white.
Maggie Murphy	"	23..	"	24..	Medium late .....	"	.....	.....	224	214	10	Round, pink.
Algoma.....	"	23..	"	25..	Very early.....	"	.....	Good.....	220	190	30	Oblong, white and pink.
World's Fair.....	"	23..	"	25..	Medium late.....	"	.....	.....	217	165	52	Round, yellowish white.
Puritan	"	23..	"	24..	Early .....	"	.....	.....	215	180	35	Roundish, white.
Lizzie's Pride.....	"	23..	"	25..	Medium late.....	"	.....	Good.....	202	167	35	Oval, white and pink.
Freeman	"	23..	"	25..	Early .....	"	.....	"	200	160	40	Oval, white.
Prize Taker.....	"	23..	"	24..	Medium late.....	"	.....	"	200	160	40	Round, red.
Toronto Queen.....	"	23..	"	24..	"	Small .....	.....	"	195	152	43	Round, pink and white.
Daisy	"	23..	"	24..	Medium early.....	Medium .....	.....	"	192	157	35	Round, white and pink.
Early Puritan	"	23..	"	25..	"	"	.....	"	189	152	37	Oblong, white.
Orphans.....	"	23..	"	24..	Late .....	"	.....	"	185	175	10	Long, round, white.
Pearce's Extra Early	"	23..	"	25..	Early .....	"	.....	"	181	143	37	Long, round, whitish pink.
Rural Blush	"	23..	"	25..	Late	Large .....	.....	Fair	178	143	35	Round, red.
Stray Beauty.....	"	23..	"	25..	Medium early.....	Medium .....	.....	"	177	147	30	Round, red.
Thorburn	"	23..	"	25..	Medium late.....	"	.....	Good.....	170	117	52	Round, pink and white.
Early Six-weeks	"	23..	"	24..	Very early.....	Small .....	.....	"	147	130	17	Round, pink.

EXPERIMENTS WITH CORN.

Seventeen varieties of corn were sown on a light loamy soil in rows and a duplicate set of plots were planted side by side in hills. From the experiments which have been conducted here during the last three years it would appear that there is a decided gain in yield by planting in rows and as the seed is sown in the rows with the seed drill, a saving in labour is also effected as compared with the planting in hills.

CORN—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date when Cut.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
				Tons.	Lbs.	Tons.	Lbs.
Rural Thorough-bred White Flint.....	May 18..	Sept. 14..	Silking.....	19	500	18	850
Angel of Midnight.....	do 18..	do 14..	Soft glazed	17	100	16	1,000
Country Gentleman.....	do 18..	do 14..	do	15	250	12	750
Red Cob Ensilage.....	do 18..	do 14..	Tasselling	14	600	13	950
New White Cap Yellow Dent.....	do 18..	do 14..	Silking.....	12	750	13	1,500
Extra Early Huron Dent.....	do 18..	do 14..	Hard glazed....	12	640	10	1,450
Compton Early... ..	do 18..	do 14..	Soft glazed	12	1,300	13	1,500
Sanford White Flint.....	do 18..	do 14..	do	12	640	11	1,650
Champion White Pearl Dent.....	do 18..	do 14..	do	12	200	10	1,450
Longfellow	do 18..	do 14..	Glazed	12	750	11	1,120
Giant Prolific Ensilage Sweet.....	do 18..	do 14..	Silking.....	11	1,650	11	....
Mam. Eight-rowed Flint.....	do 18..	do 14..	Soft glazed	11	1,100	9	700
Canada White Flint	do 18..	do 14..	Silking.....	11	1,100	14	50
North Dakota	do 18..	do 14..	Hard glazed	9	1,250	7	300
Pearce's Prolific.....	do 18..	do 14..	Glazed	9	1,250	8	500
Canadian Dent	do 18..	do 14..	do	8	1,050	8	1,050
Mitchell's Extra Early.....	do 18..	do 14..	Hard glazed	8	500	4	1,350

CORN.—Average yield per acre from corn sown in rows and hills:

	Ton.	Lbs.
Sown in hills, 1895.....	11	986
do rows 1895	12	796

SUMMARY.

Average yield per acre from experiments conducted with corn during three years, 1893-4 and 95.

—	Condition when cut.	Rows.		Hills.	
		Tons.	Lbs.	Tons.	Lbs.
Angel of Midnight.....	Soft glazed.	19	1350	14	783
Compton's Early	Glazed.	15	800	15	1166
Longfellow.....	do	13	675	10	1185
Pearce's Prolific	do	12	1300	11	1100
Mitchell's Extra Early.....	Hard glazed.	11	1283	8	1233

Average yield of corn sown in hills for three years, 12 tons 293 pounds.
Average yield of corn sown in rows for three years, 14 tons 1081 lbs.

ROBERTSON MIXTURE.

Two and three-quarter acres of corn was sown at different times ; $\frac{1}{2}$ acre on May 10th ; $\frac{1}{2}$ acre on the 17th ; and $1\frac{3}{4}$ acres on May 18th. The seed was sown with the seed drill in rows 3 feet apart. There was no apparent advantage in early sowing. The corn all matured well giving a yield of 9 ton 224 lbs. per acre.

One and one-half acres of horse beans was sown in rows 3 feet apart on May 18th. These made strong growth and matured well, yielding 5 ton 800 lbs. per acre.

Three-quarters of an acre of sunflowers was sown in rows, three feet apart, on May 24th, giving a yield of 3 ton 288 lbs. of heads per acre. These were well mixed when put in the silo. The corn and beans were cut to about $\frac{3}{4}$ of an inch in length. The sunflower heads were put in whole, making nearly 37 tons of the mixture.

EXPERIMENTS WITH GRASSES.

Of the grasses sown on 30th April, 1894, twenty varieties have proven sufficiently hardy to stand our winters. The following notes were taken on their growth during the past season :—

Canary Reed Grass. *Phalaris arundinacea*.—Growth 20th May, 16 inches, cut for seed 11th July ; growth rank, height when cut 5 feet.

Tall Oat Grass. *Avena elatior*.—Growth 20th May, 13 inches, cut for seed 9th July, height when cut 4 feet.

Awnless Brome Grass. *Bromus inermis*.—Growth 20th May, 13 inches, cut for seed 21st July, height when cut $4\frac{1}{2}$ feet, growth very thick.

Tall Fescue. *Festuca elatior*.—Growth 20th May, 10 inches, cut for seed 12th July, height when cut 3 feet 9 inches, growth medium thick.

Western Brome Grass. *Bromus Pampellianus*.—Growth 20th May, 9 inches, cut for seed 12th July, height when cut 4 feet.

Meadow Fescue, *Festuca pratensis*.—Growth 20th May, 9 inches, cut for seed 12th July, height when cut 2 feet 10 inches, fair growth.

Orchard Grass. *Dactylis glomerata*.—Growth 20th May, 12 inches, cut for seed 6th July, height when cut 3 feet 7 inches, made a good thick growth.

Sheep's Fescue. *Festuca ovina*.—Growth 20th May, 7 inches, cut for seed 6th July, height when cut 18 inches, thick growth.

Hard Fescue. *Festuca duriuscula*.—Growth 20th May, 7 inches, cut for seed July 6th, height when cut 19 inches, thick growth.

Late or Fowl Meadow grass. *Poa serotina*.—Growth 20th May 6 inches, cut for seed 2nd Aug., height when cut $2\frac{1}{2}$ feet, medium thick growth.

Meadow Brome Grass. *Bromus pratensis*.—Growth 20th May, 5 inches, cut for seed 10th July, height when cut 2 feet 8 inches, fair growth.

Upright Brome Grass. *Bromus erectus*.—Growth 20th May, 5 inches ; cut for seed 12th July ; height when cut 2 feet 10 inches ; fair growth.

Lyme Grass. *Elymus Virginicus*.—Growth 20th May, 6 inches, cut for seed 20th August, height when cut 3 feet 3 inches, thick growth.

Chess. *Bromus secalinus*. Growth 20th May, 5 inches, cut for seed 29th July, height when cut 3 feet, medium thick growth.

Western Rye Grass. *Agropyrum tenerum*.—Growth 20th May, 3 inches, cut for seed 19th July, height when cut 3 feet 2 inches, poor growth.

Sweet Vernal. *Anthoxanthum odoratum*.—Growth 20th May, 2 inches, cut for seed 6th July, height when cut 1 foot 10 inches, poor growth.

Meadow Fox-tail. *Alopecurus pratensis*.—Growth 20th May, 20 inches, cut for seed 22nd June, height when cut $3\frac{1}{2}$ feet, strong growth.

Switch Grass. *Panicum virgatum*.—Growth 20th May, 1 inch ; cut for seed 26th August ; height when cut, 2 feet, 10 inches ; fair growth.

Timothy, *Phleum pratense*.—Growth, 20th May, 7 inches ; cut for seed 5th August ; height when cut $2\frac{1}{2}$ feet.

Red Top, *Agrostis dispar*.—Growth, 20th May, 2 inches ; cut for seed 4th August ; height when cut, 18 inches ; fair growth.

CANARY SEED.

On 1st May, a one-twentieth acre plot of canary seed was sown. The soil was rather loamy, the previous crop being clover, the aftermath of which was ploughed in in the fall of 1894. This ripened 5th August, maturing in 96 days, giving a yield of 17 bushels 44 pounds per acre, with a weight per bushel of 49 pounds.

MILLET.

Two varieties of Millet, the French, and the German or Golden, were sown on 18th May on one-twentieth acre plots. These failed to germinate well, probably due to the dry weather, and, the growth being weak, they were ploughed up.

BEANS.

Six varieties of beans were sown on 31st May :

Name of Variety.	Ripe.	Number of days Maturing	Remarks.
Arctic.....	Sept- 4	96	White and yellow, very prolific.
Early Dun Colour.....	do 6	98	Dun colour, very prolific.
Refugee Wax.....	do 7	99	White, medium prolific.
Red German Wax.....	do 7	99	Red and white, very prolific.
Detroit Wax.....	do 8	100	Black and white, very prolific.
Prince William.....	do 8	100	Poor growth.

WATER AND MUSK MELONS.

Six varieties of Musk and two of Water melons were sown in the open ground on 31st May. On account of the dry weather these made poor growth and failed to produce fruit. The following varieties were sown of Musk melon: the Osage, New Port, Christiana, and Hackensack. Of Water melons the Peerless and Mountain Sweet were the varieties tested.

CUCUMBERS.

Eight varieties of cucumbers were sown on 31st May. On account of the dry weather these did not make very strong growth.

Noah's Forcing.—Fairly productive, a good variety for forcing.

Improved White Spine.—Prolific, one of the best for general use.

Improved Long Green.—Good cropper, long, firm and crisp.

Tailby's Hybrid.—Medium productive, quality good.

Rollinson's Telegraph.—16 to 20 inches long, very prolific.

Japanese Climbing.—Very prolific, of a good quality.

Lord Kenyon's Favourite.—Crisp and firm, quality good.

Livingston's Evergreen.—Strong grower, quality good.

ONIONS.

Eight varieties of onions were sown on 8th May. These failed to bulb well, and some varieties formed scullions badly. The onion maggot (*Phorbia ceparum*) did

considerable damage. Carbolic emulsion was used and proved quite effective in checking the pest.

Name of Variety.	Yield of marketable.	Yield of unmarketable.
	Lbs.	Lbs.
Yellow Flat Danvers.....	34	37
Silver Skinned	24	24
Red Globe Danvers	20	36
Southport Yellow Globe.....	21	33
Large Yellow Globe Danvers.....	15	30
Large Blood Red Wethersfield.....	15	60
Southport Large Red Globe.....	15	45
Giant Spanish Yellow.....	....	10

PARSNIPS.

Four varieties of parsnips were sown 8th May.
Maltese.—Fair quality.
Half Long Guernsey.—Failed to grow.
Student.—Not as good as Hollow Crown.
Hollow Crown.—Finest variety.

GARDEN CARROTS.

Five varieties of table carrots were sown 8th May. In point of earliness for house purposes they rank in the order named :—
Danver's Improved Half-long.—Good market variety.
Mitchell's Half-long.—Fair market variety.
Scarlet Model.—Fair market variety.
Henderson's Intermediate.—Good market variety.
Short Valery.—Fair market variety.

BEETS.

Five varieties of beets were sown 8th May. As to quality, they rank in the order named :—
Evans' Medium.—Fairly productive.
Early Blood Turnip.—Fairly productive.
Rennie's Intermediate.—Very productive.
Ne Plus Ultra.—Fairly productive.
Whyte's very deep.—Very productive.

GARDEN CORN.

Five varieties of garden corn were planted on 18th May. The following notes were taken when fit for table use :—

Name of Variety.	Fit for table use.	Remarks.
Mitchell's Extra Early.....	Aug. 28....	Cobs, small.
Early Marblehead.....	Sept. 2...	Cobs fair size, fine flavour.
Early Minnesota.....	" 6....	Cobs fair size, good flavour.
Perry's Hybrid.....	" 10....	Large, fine.
Champion Sweet.....	" 10...	Large, good quality.

GARDEN PEASE.

Fifteen varieties of garden pease were sown on 8th May, all of these made good growth :

Name of Variety.	Fit for use.	Remarks.
Little Giant.....	July 9...	A prolific dwarf of good flavour.
Hair's Dwarf Mammoth.....	do 22..	Medium prolific, good quality.
C. P. R.....	do 23..	Very prolific, good flavour.
Telegraph.....	do 21...	do excellent quality.
Shropshire Hero.....	do 22..	Prolific, extra good quality.
Maud S.....	do 8...	Medium prolific, fair quality.
Sunol.....	do 6..	do do
Juno.....	do 24..	Fairly productive, fine flavour.
Heroine.....	do 22..	Prolific, excellent quality.
Burpee's Profusion.....	do 20..	Very prolific, good quality.
Bliss' American Wonder.....	do 10...	do fine quality.
Horsford's Market.....	do 20..	Prolific, excellent.
Stratagem.....	do 20..	Very prolific, fine quality.
Pride of the Market.....	do 13...	do do
Prince of Wales.....	do 18...	Prolific, good quality.

RADISHES.

Nine varieties of radishes were sown in the open ground on 8th May. These made good strong growth but proved to be infested with the radish maggot. These were all dug up and destroyed on 15th June. The following notes were taken :

French Breakfast.—Best for hot bed growing ; of quick growth and fine quality, fit to use 12th June.

Rosy Gem.—Fine for hot bed growing ; mild flavour and crisp ; fit to use 13th June.

Scarlet Button.—Very fine, not large, good flavour, fit for use 14th June.

Ne Plus Ultra.—Good quality—fine forcer, fit to use 13th June.

Rond Rose Hatif.—Fine flavour, a good forcing variety, fit to use 13th June.

Vaughan's Earliest Carmine Turnip.—Of excellent flavour and crisp, fine for forcing, fit for use 13th June.

Long Bright Scarlet.—Medium late, fine field market variety.

Golden Turnip.—Late variety.

China Rose Winter.—Very late winter variety.

TOMATOES.

Seventeen varieties of tomatoes were sown in the hot bed on 18th April. These were thinned to about one inch apart, and were transplanted to the open ground on June 5th. They all made excellent growth, and all the varieties ripened more or less fruit. The Conqueror, a very desirable smooth variety proves, to be one of the most prolific. Vaughan's Earliest Of All ripened first ; and although somewhat rough it is of fine quality. The yield of the different varieties was obtained by weighing the entire product of two plants to the end of maturity.

TOMATOES.

Name of Variety.	Date when first Ripened.	Yield from two Plants-
		Lbs.
Earliest of All.....	Aug. 18..	9
Mayflower.....	do 26..	4
Atlantic Prize.....	do 30..	13
Dwarf Champion.....	do 31..	8
Mitchell's No. 1.....	Sept. 1..	7
Dwarf Aristocrat.....	do 4..	9½
Early Michigan.....	do 4..	8
Large Red.....	do 4..	9
Fordhook's First.....	do 4..	7
Early Conqueror.....	do 5..	19½
Early Ruby.....	do 5..	8¼
Canada Victor.....	do 5..	9½
Trophy.....	do 5..	11
Everbearing.....	do 7..	5½
Acme.....	do 8..	6½
Optimus.....	do 8..	4
Ponderosa, Henderson's.....		7¼

LETTUCE.

Nine varieties of lettuce were sown in the open ground on May 8th. Duplicate plots were filled with lettuce transplanted from the hot-bed on June 19th. The transplanted lettuce headed better than that sown in the open ground.

- Early Ohio.—Fine early variety.
- Big Boston.—Good quality, heads well.
- Early Curled Silesia.—One of the best early kinds.
- California All Heart.—Fine and crisp, heads well.
- Imperial Cabbage.—Tender and of good quality, heads well.
- Defiance.—Good variety, fair header.
- Nonpareil.—Crisp and excellent.
- New Blonde Beauty.—Tender and crisp, good flavour, an excellent market variety.
- Paris White Cos.—One of the best of the Cos varieties, these should be tied up to blanch.

CABBAGE.

Fifteen varieties of cabbage were sown in the hot bed on 18th April and transplanted to the open ground May 23rd. The cabbage root maggot, *Anthomyia Brassicæ*, again made its appearance and although various methods were resorted to for the destruction of this pest, most of the plants were killed and the plants had to be reset. Seed was sown in the open ground May 18th. The plants made strong growth and were not affected with the root maggot and headed well.

Early Varieties Sown.

- Extra Early Express—The earliest cabbage grown, Good header, finest quality.
- Henderson's Early Summer.—Large and solid, later than the Wakefield.
- Jersey Wakefield.—Very early, pyramidal in shape, fine header.
- Dwarf York—Heads small and solid. Good quality.
- Early Winningstadt—Good header, excellent flavour. One of the best for general use.
- Early Etampes—Medium heads, fine quality. Medium solid.

Second Early.

Drumhead Savoy—Large head, firm.

Henderson's Succession—Fair head, firm, of good quality.

Vandergaw—Fair size, good header, solid.

Late.

Marblehead Mammoth Drumhead, very solid, good header, fine winter variety.

St. Denis Large Drumhead, firm, good header, fine quality.

Filderkraut, solid head, good quality, fine keeper.

Late Flat Dutch, solid head, fine winter variety.

German Drumhead Savoy, large, fine quality, solid.

Dark Red Erfurt, medium large, blood red, crisp, fine for pickling.

CAULIFLOWER.

Thirteen varieties of cauliflower were sown in the hot bed on 18th May, and transplanted to the open ground 23rd May. The root maggot was first noticed July 12th and subsequently some of the varieties were completely destroyed.

Early Snowball, one of the earliest dwarf, and compact.

Gilt Edge, sure to head ; quality good.

Demi-Dur, early, medium head, compact and firm.

Extra Early Erfurt, dwarf, good to head, firm of good quality.

Dwarf XXX. Erfurt, large, firm ; quality excellent.

Early Favourite, large, firm, compact head, quality good.

Extra Early Whitehead, solid compact, white, of fine quality.

Walcheren, heads large, firm and compact, fair header,

Late Algiers, firm, good header, excellent quantity.

CELERY.

Seventeen varieties of celery were sown in the hot-bed 18th April, and transplanted to the open ground 27th June. These all made strong growth. Among the most promising kinds are:

White Plume, dwarf, early, self-blanching, of fine flavour.

Paris Golden Yellow, self-blanching, crisp and firm, of fine quality.

Boston Market, dwarf growth, crisp and solid, good quality.

Simmer's Ribbed Dwarf, white, crisp, of fine flavour.

Giant Pascal, solid, crisp, flavour excellent, one of the finest winter varieties.

Rennie's Giant White, white, large, solid, thick, quality fair.

New Rose, crisp, fine flavour, good for late use.

Giant Golden Heart, white, crisp, flavour fair, good keeper.

The other varieties are :

Perfection Heartwell, Evans New Triumph, Perle La Grande, De Candolle, Henderson's Golden Dwarf, Golden Yellow Large Solid, Turkish Giant Purple, White Solid, and Carter's Incomparable Dwarf Crimson.

ASPARAGUS.

Three varieties of asparagus, the Giant, Palmetto and Donald's Elmira were sown on 18th June. These made good growth. The three varieties planted last year made strong growth and will probably give good returns next season.

HOPS.

The two varieties of hops, California Cluster and East Kent Goldings, planted in the spring of 1894, made strong growth and produced a fair crop.

TOBACCO.

Six varieties of tobacco were sown in the hot-bed on 9th May, and transplanted to the open ground on 27th June. These all made strong growth, but failed to properly mature. The following were the varieties sown:—Blue Pryor, Connecticut Seedleaf, Kentucky, Havana, Cannelle and White Burley.

STRAWBERRIES.

Of the fourteen varieties of strawberries reported as under test last year, only eight survived the winter, and of these only a limited number of plants were secured. These have been moved to a more favourable locality where it is hoped better results will be obtained. Eleven varieties were received on 24th April, from the Central Experimental Farm, these were planted 2nd June. Some of these varieties made strong, and others only poor growth. As to the season's growth they rank in the order named:—Warfield, Crescent, John Little, Jas. Vick, Pearl, Beverly, Williams, Parker Earle, Haverland, and Beder Wood.

On 30th August, plants of twelve varieties were received from the Central Experimental Farm. Five of these were to complete plots which had partially died after spring planting, these were: Pearl, Beverly, Williams, Parker Earle, and Beder Wood. Those added as new varieties were: Captain Jack, Shirts, Woolverton, Leader, 1001, Iowa Beauty and Wilson.

GRAPES.

In the spring of 1891, a vine of the Green Mountain grape was procured from a local nurseryman. This made a strong growth and was removed to permanent quarters in the spring of 1893. The growth during this period showed this to be a very vigorous and hardy grape. In 1894 this vine bore twelve well formed bunches, but on account of the very early frost of 7th September, the fruit did not reach maturity. Some 65 bunches were formed on this vine during the past season, these all ripened well, being fully matured by 25th September. The vine is strong and healthy with large foliage; very productive; fruit of good quality; bunch and berry of medium size, fruit greenish-white and a good keeper; keeping in the cold store-house till the middle of October.

Eight additional varieties were received from the Central Experimental Farm and set out on 2nd May, these made promising growth, the following are their names: Lady, Rogers 17, Vergennes, Moore's Diamond, F. B. Hayes, Barry, Florence and Herbert.

CURRANTS.

The eleven varieties of currants reported as under test last year made strong growth and produced a considerable quantity of fruit.

White Varieties.

White Transparent.—Strong growth, very productive, fruit large, of excellent quality, ripe 1st August.

White Grape.—Similar to the White Transparent.

White Dutch.—Strong growth, very productive, fruit large, flavour fine, ripe 1st August.

Red Varieties.

Red Dutch.—Very strong growth, productive, fruit large and of good quality, ripe 2nd August.

La Fertile.—Growth fair, fairly productive, fruit large and of excellent quality, ripe 2nd August.

8c—18½

La Hative.—Made moderately strong growth, medium in productiveness, fruit large, flavour excellent, ripe 30th July.

Knight's Early Red.—Strong growth, very productive, fair quality, ripe 27th July.

La Conde.—Very strong growth, moderately productive, fruit large, of good quality, ripe 29th July.

Black Varieties.

Ogden's Black.—Strong growth, moderately productive, fruit medium to large and of excellent quality, ripe 2nd August.

Lee's Prolific.—Strong growth, prolific, fruit large, and of good quality. Ripe 2nd August.

Baldwin's Black.—Strong growth, fairly productive, quality good, ripe 6th August.

GOOSEBERRIES.

The gooseberries reported as under test last year, made in many cases strong growth. Some of the varieties are very promising for this locality. Mildew and other fungous growths were kept completely in check by the application of Bordeaux mixture.

English Varieties.

Queen Victoria.—Strong growth, large fruit, fair flavour, ripe 2nd August.

Whenham's Industry.—Very strong growth, fruit large, flavour good, ripe 2nd Aug.

Green Overall.—Weak growth, fruit large, extra good flavour, ripe 2nd August.

Companion.—Fair growth, flavour fair, ripe 3rd August.

White Champagne.—Very strong growth, medium to large fruit, flavour good, ripe 3rd August.

Governess.—Medium growth, fruit medium, of fair quality, ripe 4th August.

Pitmaston Green Gage.—Weak growth, fruit small, of excellent flavour, ripe 4th August.

Dublin.—Growth fair, fruit large, of extra quality, ripe 5th August.

Bobby.—Growth poor, fruit large, of excellent quality, ripe 6th August.

Red Champagne.—Growth fair, fruit small, quality excellent, ripe 10th August.

Whitesmith.—Very strong growth, very productive, fruit medium, ripe 10th August.

Leveller.—Strong growth, fruit large and firm, of good quality, ripe 11th August.

American Varieties.

Houghton.—Growth strong, fruit small, good, tender and sweet, ripe 2nd August.

Smith's Improved.—Growth very strong, fruit medium in size and of good quality, ripe 6th August.

Downing.—Very strong growth, very productive, fruit of medium size and fair quality, ripe August 8th.

RASPBERRIES.

In addition to the Cuthbert and Golden Queen ; which have proved to be the best and hardiest varieties so far tested, eight new sorts have been added, viz., Clarke, Hornet, Marlboro, Niagara, Hansell, Hebner, Reeder and Hudson River Antwerp. The last named variety was kindly supplied by Campbell Black, Esq., Truro. All these newly added sorts have made strong growth.

BLACK RASPBERRIES.

Four varieties of black raspberries were also received from the Central Experimental Farm and have made fair growth. The varieties are: Tyler, Older, Progress and Smith's Giant.

BLACKBERRIES.

Five varieties of blackberries were planted on 2nd May, these have made strong growth. They are Ancient Briton, Snyder, Agawam, Stone's Hardy and Eldorado.

JUNE BERRIES.

Several Dwarf June berries were received from the Central Farm and planted 2nd May. They have not made strong growth, but are now fairly well rooted and will probably make more progress next season.

LARGE FRUITS.

Many additions have been made to the orchards since last year.

The total number of varieties of fruit now growing in orchards and in nursery rows ready for planting in orchards are : Apples 147, Crab Apples 12, Pears 36, Cherries 39, Plums 41, Apricots 3, Nuts 10. Total 288 varieties.

The orchards generally have made good growth, and have produced a limited quantity of fruit.

Forty varieties of apples fruited this year, among the most productive are : The Yellow Transparent, Longfield, Duchess, Haas, Mann, Scott's Winter, Grimes' Golden, Golden Russet, Red Astrachan, Alexander and Talman's Sweet.

Nine of the cherries fruited, namely Wragg, Montmorency, English Morello, Lieb, Ostheim, Olivet, Early Richmond, Coe's Transparent and Orel.

Of the plums, eight varieties fruited, viz. : Lawrence's Favourite, Shipper's Pride, Reine Claude, Lombard, Moore's Arctic, Imperial Gage, Pond's Seedling and Coe's Golden Drop.

ORNAMENTAL TREES AND SHRUBS.

In addition to the shrubs and ornamental trees reported on last year, 165 different varieties were planted this fall. It is hoped that as a result of these useful tests, reliable information will soon be available as to the most hardy and desirable sorts for the Maritime Provinces, so that the farmer and the citizen may be enabled to beautify their homes, without running the risk of failure from selecting tender sorts.

HEDGES.

Twenty-one different sorts of trees and shrubs have been planted as hedges, each 50 feet long. This test will be a most interesting and instructive one, and will soon furnish reliable information as to the best varieties to select for this purpose.

FLOWERS.

Most of the flowers reported on last year, were again grown during the past season, with the addition of some new varieties.

DRAINAGE.

In addition to the four acres of marsh land underdrained last year, two acres were drained in the spring. The underdraining on the marsh has given excellent satisfaction; all the drains are working well.

SWINE.

Three breeds of pigs are kept: the Tamworth, Yorkshire, and Berkshire. The boars are available to the farmers for service, and the young stock from these breeds find a ready sale, being shipped to various parts of the provinces.

POULTRY.

Three breeds of poultry are kept: the Red Caps, Plymouth Rocks, and White Leghorns.

DISTRIBUTION OF SEED GRAIN, AND POTATOES.

In all, 341 applicants were supplied during the past season with samples of potatoes, wheat, oats, rye, pease or barley.

Total number of packages sent out:—

Oats.....	302
Potatoes.....	198
Barley.....	121
Wheat.....	76
Pease.....	52
Rye.....	9
Total.....	758

MEETINGS ATTENDED.

Meetings of farmers were attended in different parts of the Maritime Provinces, where subjects bearing on agriculture were discussed.

Fredericton, N.B., 6th and 7th March.
 Bridgetown, N.S., 8th March.
 Berwick, N.S., 9th March.
 Windsor, N.S., 11th March.
 Wolfville, N.S., 12th March.
 Upper Stewiacke, N.S., 14th and 15th March.
 Great Village, N.S., 26th March.
 Sussex, N.B., 28th March.
 Folly Village, N.S. 1st April.
 Truro, N.S., 2nd April.
 Lions Brook, N.S., 4th April.
 East Florenceville, N.B., 27th June.
 Andover, N.B., 28th June.
 Antigonish, N.S., 3rd July.
 Pugwash, N.S., 11th July.
 Georgetown, P.E.I., 3rd October.

EXHIBITIONS ATTENDED.

The International Exhibition at St. John, N.B., United Counties Exhibition, New Glasgow, N.S., Westmoreland County Exhibition, Sackville, N.B., and King's County Exhibition, Georgetown, P.E.I., were attended during the past season.

I have the honour to be,

Your obedient servant,

W. M. BLAIR,
Superintendent.

Map of
GOVERNMENT EXPERIMENTAL FARM
 BRANDON MANITOBA



EXPERIMENTAL FARM FOR MANITOBA.

BRANDON, MAN., 30th November, 1895.

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my eighth annual report with details of the experiments undertaken and work accomplished on the Brandon Experimental Farm during the past year.

The past season has been a remarkable one in some respects.

The temperature of the three spring months was slightly above the average, with nearly double the average rainfall in May, while the temperature of the three summer months was considerably below the average, accompanied by an abundance of rain, evenly distributed in light showers, the natural result of this was a rank growth of straw with long well filled ears, and the heaviest yields of grain the province has experienced in its history.

Spring opened up early, a considerable quantity of grain having been sown during the first week in April, and it was expected that the crop would mature early, but owing to the low summer temperature, ripening was greatly delayed and in some parts of the province the frost of 20th August found the grain in a very green condition, and considerable injury resulted.

In the central and south central parts of the province a hot wind from the 2nd to 4th of July, accompanied by a temperature of from 90 to 92° in the shade, did considerable damage to early sown wheat just coming into head, the injury was more apparent on high, dry ridges and on poorly farmed land devoid of sufficient moisture, in some cases the ears of wheat were only half filled, reducing the yield very materially.

On this farm the returns of nearly all farm produce is above the average. Owing however, to a heavy storm on August 8th, the grain was badly lodged and the ripening so much delayed that a considerable portion of the wheat was injured by the frost of August the 20th.

It is pleasing to notice the very general acknowledgment of service done the province through the results of experiments carried on in cutting wheat at different stages of ripeness, the conclusions reached at the Experimental Farm at Brandon, have been very generally acted on, with the result that large quantities of grain were this year saved from injury by frost by cutting it slightly on the green side, we regret, however, that some farmers have gone to the other extreme and cut grain altogether too green, resulting in a very much shrunken berry.

It is also a source of gratification that the results of the leading experiments carried on at this farm are so uniform from year to year, it makes the conclusions reached more impressive and indicates the suitability of the very uniform prairie soil for experimental work.

EXPERIMENTS WITH WHEAT.

This year thirty-five varieties were sown, twelve of which were cross-bred wheats, originated on the Dominion Experimental Farms. The following varieties have been tested here for the first time, Rideau, Admiral and Alpha, they are beardless sorts and they have all yielded over forty bushels per acre.

Owing to a large number of the varieties lodging, the dates of ripening given on the table are only approximate, the same cause has in some cases reduced the weight per bushel.

Gehun, Ladoga and Colorado are the only three that ripened to any noticeable extent in advance of Red Fife.

It is to be observed that the first seven on this year's list, are all varieties that have taken the lead for productiveness in other years.

Preston the second in the list in the variety test, gave the largest yield (52 bush. per acre) in the one-acre plots, it is apparently a very productive wheat and also weighs well.

WHEAT.—Test of Varieties.

(These were all sown on the 16th of April, on clay loam, in $\frac{1}{10}$ th acre plots.)

Name of Variety.	Date of Ripening.	No. of days maturing	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.	Rusted.
			Ins.		Ins.		Lbs.	Bush. Lbs.	Lbs	
Red Fife	Aug. 27	133	39	Stiff ...	3½	Beardless..	5,760	49	60½	None.
Preston	" 27	133	43	"	4	Bearded..	6,010	48·20	61	"
Old Red River.	" 27	133	37	"	3½	Beardless..	5,670	47·10	61	"
White Fife	" 27	133	38	"	3¼	" ..	5,900	46·40	60	"
Pringle's Champlain....	" 27	133	43	Lodged	4	Bearded..	5,510	46·30	60	Slightly.
Advance	" 28	134	42	Stiff ...	3½	" ..	5,020	46·20	60	None.
White Connell.....	" 27	133	42	"	4	Beardless..	5,810	44·50	60	"
Stanley	" 27	133	45	"	4	" ..	4,490	43·30	62	"
Rideau	" 31	137	38	"	2½	" ..	4,920	43	60	"
Admiral.....	" 28	134	51	Lodged	4	" ..	5,830	42·50	60	"
Crown	" 24	130	50	Stiff ...	4	Bearded..	5,330	42·50	59	Slightly.
Gehun	" 20	126	30	Medium	3	Beardless..	3,940	42·40	61	Considerably.
Goose Wheat	" 27	133	50	Weak ..	3	Bearded..	4,900	42·10	62	None.
Hungarian Mountain....	" 31	137	39	"	3½	Beardless..	5,420	42·10	60	"
Ladoga	" 22	128	45	Lodged	3	Bearded..	6,070	42·10	60	Considerably,
Rio Grande.....	" 27	133	43	" ..	4	" ..	5,610	41·30	60	None.
Herisson Bearded.....	Sept. 2	139	40	Stiff ...	2	" ..	5,510	41·30	60	"
Red Fern.....	Aug. 27	133	43	"	4	" ..	5,730	41·10	60	"
Percy	" 19	125	51	Fair ...	3¾	Beardless..	4,240	41	60½	"
Alpha	" 28	134	44	Stiff ...	4	" ..	4,680	40·20	60	"
Emporium	" 27	133	45	"	5	Bearded..	6,280	39·30	60	"
Campbell's White Chaff....	" 28	134	47	" ..	4	Beardless..	5,020	38·50	60	Considerably.
Black Sea	" 24	130	49	Lodged	3½	Bearded..	5,840	38·30	61	"
Dion's	Sept. 2	139	43	"	4	" ..	4,520	38·20	60	Slightly.
Golden Drop	Aug. 22	128	35	Stiff ...	3¼	Beardless..	4,680	37·50	62	"
Blenheim	" 27	133	46	"	4	Bearded..	5,260	37·20	60	None.
Yeoman's Defiance	" 31	137	40	Weak ..	4	Beardless..	4,620	37·10	60	"
Wright's Favorite	Sept. 2	139	41	Stiff ...	3½	" ..	5,180	37	60	"
Monarch	" 2	139	38	"	3	" ..	5,810	36·30	58	"
Major	Aug. 28	134	54	"	4	Bearded..	6,360	35·40	61	"
White Russian	Sept. 2	139	39	"	3	Beardless..	5,220	35·30	58	"
Colorado	Aug. 22	128	47	Lodged	4½	Bearded..	6,150	34·10	59	Very badly.
Wellman's Fife.....	Sept. 2	139	40	Stiff ...	3	Beardless..	5,260	34	56	None.
Captor	" 2	139	40	"	3½	" ..	5,000	32·30	59½	Slightly.
Beaudry	Aug. 24	130	44	Lodged	3¾	" ..	2,470	25·36	60	"

NOTE.—The weights per bushel given here, and also with all other grain tables in this report, are not the maximum weights that the grain could be brought to, but were taken from grain cleaned to a condition fit for milling purposes only.

The parentage of the cross-bred varieties referred to in the table is as follows :

Alpha—Ladoga female with White Fife male.....	Beardless.
Advance “ “ “	Bearded.
Admiral—White Chaff female with Red Fife male.....	Beardless.
Blenheim—Ladoga female with White Fife, male.....	Bearded.
Captor “ “ “	“
Crown “ “ “	“
Major “ “ “	“
Preston “ Red Fife, “	“
Percy “ White Fife “	Beardless.
Rideau—Spiti Valley “ Red Fife “	“
Stanley—Ladoga “ “ “	“

TEST OF WHEAT FROM HUNGARY.

Hungary has for many years been noted for the excellent quality of its flour. The sample of wheat here referred to is one of the most esteemed varieties grown in that country it was received at the Central Experimental Farm from the Baron Von Berg a prominent agriculturist of Kapowar, Hungary, for test at the experimental farms. It was sown along side of Red Fife on 23rd April on one-tenth acre plots of rich sandy loam.

It will be seen that the wheat is bearded, that it has this year ripened three days earlier than the Red Fife, and given almost the same yield per acre.

Name of Variety.	Date of Ripen- ing.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	Weight per Bushel.	Proportion Rusted.
			Ins.		Ins.		Lbs.	Bush. 45 4 0	Lbs. 60	
Wheat from Hungary.....	Aug. 26	125	37	weak	3½	bearded	4960			none.
Manitoba Red Fife.....	“ 29	128	38	stiff	3½	beardless	5430	45 20	60	“

THE PREPARATION OF LAND FOR WHEAT.

A great diversity of opinion prevails regarding the most suitable way of preparing land for wheat. The accompanying table gives the results of sowing a series of adjoining plots prepared in four different ways. The summer fallow was ploughed deeply in June and cultivated on the surface during the summer to keep down weeds. The “drilled on stubble” plot was summer fallowed in 1893 was quite free of weeds, and received no preparatory treatment, the seed being simply press drilled as deeply as possible with a “superior” machine.

Name of Variety.	How Treated.	When Sown.	When Ripe.	No. of Days Maturing.	Length of Straw.	Yield of Straw per Acre.	Yield per Acre.	Weight per Acre.
					Ins.	Lbs.	Bush. Lbs.	Lbs.
Red Fife.....	Summer fallow.....	April 16	Aug. 28	134	40	5,420	48	60
do	Drilled on stubble. . . .	do 16	do 19	125	36	3,670	34 40	60
do	Spring ploughed	do 13	do 13	122	36	2,750	24 10	62
do	Fall do	do 13	do 13	122	36	3,280	18 40	60

GENERAL RESULTS.

- 1st. As in former years summer-fallowed land gave last season much the largest yield; in this instance over 13 bushels more than the drilled on stubble plot, nearly 24 bushels more than the spring, ploughed, and over 29 bushels in excess of the fall-ploughed plot.
- 2nd. The yield of straw on the summerfallow was very heavy and the ripening of the grain was delayed by the rank growth, this is about the only objection to summer-fallow on strong land in a moist season.
- 3rd. It would appear from several years' experience here that fall-ploughing of clean stubble land for wheat, is a waste of time, as it has invariably given a less return than if the seed is sown on the unploughed stubble.
- 4th. The above result may be accounted for by the drying out of the soil during fall and winter and by the heavy stubble ploughed under, keeping the soil too loose for wheat.
- 5th. Drilling on the unploughed land keeps the stubble on the surface where it acts as a mulch.
- 6th. Only one crop should be taken off without ploughing, the land should then be spring-ploughed for coarse grain, or summer-fallowed for wheat.

THE USE OF MANURE FOR WHEAT.

Three plots of $\frac{1}{10}$ th acre each were set apart for this experiment, equal parts of cow and horse manure was used, and ten two-horse loads of one ton each per acre was applied by ploughing it in about six inches deep.

It would appear from experiments in former years on this farm that manure ploughed under in spring *during a dry season* reduces the yield of wheat the first year. This season owing to unusual conditions of moisture the result was different, still the gain from the use of rotted manure from the first crop was only 50 lbs. of wheat per acre, and from green manure exactly one bushel per acre, it is, however, evident from former experiments that the manure continues to be beneficial to the land for some years after the application, and one of the methods for keeping up the fertility of the soil in this province is to make and apply all the manure possible.

Name of Variety.	How Treated.	Manure.	When sown.	When ripe.	No. of days maturing.	Length of straw.	Yield of straw per acre.	Yield per acre.	Weight per bushel.
						Ins.	Lbs.	Bush. Lbs.	Lbs.
Red Fife. . .	Spring ploughed.	Green ..	April 13	Aug. 13	122	24	3,290	25 10	61
do	do ..	Rotted .	do 13	do 13	122	24	2,900	25 ..	61
do	do ..	None ..	do 13	do 13	122	24	2,750	24 10	62

SMUT IN WHEAT.

Although many carefully conducted experiments on the Experimental Farms have repeatedly shown the advantage of the bluestone treatment for the prevention of smut in wheat ; there are still a number of farmers, who either do not treat their seed grain, or do it in such a careless manner, that each year a large quantity of wheat is rejected for smut, the loss from this cause is still so large that it was thought advisable to continue these experiments.

In addition to applying the liquid by sprinkling , one plot was this year sown with seed immersed in the bluestone liquid for five minutes, it will be seen that this plot gave the smallest number of smutty heads, and also the largest yield of wheat. The liquid for the dipped seed was composed of 1 lb. bluestone to three pails of water, the

grain can either be put into a coarse bran bag and placed in the liquid, or treated as recommended for coarse grain in another part of this report.

The grain used was a very bad sample of smutty Red Fife.

The plots in this test were one-tenth acre, and the soil a rich sandy loam.

The weights per bushel given, were taken before the smut balls were removed, hence the light weight of the untreated.

Name of Variety.	How Treated.	Good heads on 10 feet square.	Bad heads on 10 feet square.	Weight of straw per acre.	Yield per acre.		Weight per bushel.
				Lbs.	Bush.	Lbs.	Lbs
Red Fife, very smutty..	Dipped in bluestone liquid.....	4,700	32	5,820	44	40	58
do do ..	Sprinkled 1 lb. bluestone to 5 bush	4,169	256	5,480	43	40	60
do do ..	do do 10 do	3,791	1,243	5,710	38	10	59
do do ..	Not treated.....	914	3,685	5,430	17	50	50

SUMMARY.

1st. The dipped seed gave the smallest number of smutty heads and the largest yield of grain per acre.

2nd. The yield was exactly one bushel less from the sprinkling of the strongest liquid, than from the dipped, but the sprinkled gave 200 more smutty heads per 10 feet square.

3rd. The difference in yield between the weakest sprinkling and the untreated was over 100 per cent. Or in other words for about two cents worth of bluestone and labour, twenty bushels of wheat was saved and the sample greatly improved.

4th. Sprinkling of very smutty wheat with the weaker solution is not sufficient to kill all the smut.

5th. Although it was necessary in this case to use badly smutted wheat so as to make the experiment emphatic, we would advise no one to use smutty grain for seed even when treated.

6th. In five years' experience on this farm, we have never had smutty grain from good seed sprinkled with the weak bluestone liquid.

TEST OF DRILLS AND BROADCAST MACHINE FOR WHEAT.

In this experiment the drills have again given the best result, the difference in favour of the press drill over the broadcast machine is this year over eight bushels per acre.

The press drill plot also ripened six days earlier than the broadcasted grain.

When the grain was only two inches high, it was quite evident that the drilled grain would give the best return, and these series of plots were a good object lesson to visiting farmers all the summer.

The tests referred to have been conducted on plots of $\frac{1}{10}$ acre ; soil rich loam.

DRILL Test for Wheat.

Name of Variety.	How sown.	When sown.	Pecks per Acre.	When ripe.	No. of days Maturing.	Length of Straw.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
						Ins	Lbs.	Bush.	Lbs.	Lbs
Red Fife	Press drill	April 16	6	Aug. 28	134	46	6,740	46		60
do	Common drill.....	do 16	7	do 31	137	40	7,220	44	40	58
do	Broadcast machine.....	do 16	8	Sept. 3	140	40	6,710	37	20	58

WHEAT GROWN AFTER FODDER CORN.

The area planted to fodder corn in this country is increasing each year, the land being usually sown to wheat the following season ; either spring ploughed or on the unploughed stubble.

From the test made this year it would appear that it may pay to plough the corn stubble before sowing wheat. This test was made on plots of one tenth acre, sandy loam, and the seed was sown 9th April.

Name of Variety.	How prepared.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
				Ins.		Ins.		Lbs.	Bush. Lbs.	Lbs
Red Fife	Spring ploughed .	Aug. 12..	125	25	Stiff.....	3	Beardless.	3,860	32 20	61
do	Not ploughed....	do 12..	125	24	do	3	do ..	3,830	29 30	61½

ONE-ACRE PLOTS OF WHEAT.

The following table gives the yield of nine varieties of wheat in plots of one acre each. Owing to unevenness in the character of the soil of this field these results cannot be regarded as a very reliable test of the relative productiveness of the several sorts named. These plots were all sown on 12th April on a loamy soil, which varied from sandy to clay.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.	Rusted.
			Ins.		Ins.		Bush. Lbs.	Lbs.	
Preston.....	Aug. 22....	132	49	Very stiff..	3½	Bearded....	52	63½	None.
Blenheim...	do 17....	127	49	Stiff	3½	do	46 58	61½	do
Percy	do 14....	124	50	Medium....	3½	do	46 24	58	do
White Fife .	do 13....	123	45	Stiff	4	Beardless...	44 48	61½	do
Crown	do 22....	132	43	Very stiff..	3½	Bearded....	43 23	60½	Slightly.
Major	do 17....	127	43	Stiff	3½	do	41 26	60	None.
Ladoga.....	do 19....	129	46	Medium....	3½	do	41 5	61	Slightly.
Captor	do 13....	123	50	Stiff	4	Beardless...	37 20	61½	None.
Dion's	do 23....	133	52	Medium....	4	Bearded....	36 55	59½	Slightly.
Ottawa.....	do 19 ...	129	49	Stiff	3½	Beardless...	36 10	61	None.

RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These very interesting series of experiments have been continued this year with much the same results as in former years, in every instance the earliest sown wheat and oats ripened the first, but only in one instance, viz.: Stanley wheat did the earlies, sown give the largest return.

With Red Fife the fourth plot gave the best return ; with both Banner and Abundance oats the last sown plot gave the largest yield.

The severe frost (ten degrees) of May 11th, seriously interfered with the test of barley's, so much so that the dates of ripening given are only approximate.

The first four plots of Oderbruch barley were cut to the ground 11th May, and more or less thinned out, the Canadian Thorpe, although sown at the same date suffered very little injury, none of the wheats or oats were hurt.

For the purpose of comparing varieties the average yields of all the sowings is also given. The Stanley wheat, Banner oats and Canadian Thorpe barley are the varieties which have given the largest returns, this is the first year that Stanley has exceeded Red Fife and this is no doubt attributable to the Stanley ripening earlier and so receiving less injury from frost, the first two plots of Red Fife and the first three plots of Stanley would grade No. 1 Hard, the balance was all more or less frozen.

Twelve additional plots were sown with pease, but a severe wind storm rising soon after the pease were cut, they were so badly mixed that an accurate comparison of yields was not possible.

WHEAT—EARLY, MEDIUM AND LATE SOWINGS.

(One-tenth acre plots—soil, clay loam.)

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.		Character of Straw.	Length of Head.		Kind of Head.	Weight of Straw, per acre.		Yield per acre.		Weight per Bushel.	Rusted.
					In.			In.		Lbs.	Bush.	Lbs.	Lbs.		
Red Fife	April 6	Aug. 17	133	44	Stiff.	3½	Beardless.	4 870	43 50	62	None.				
do	do 13	do 27	136	43	do	3½	do ..	4 820	43 ..	62	do				
do	do 20	do 31	133	40	do	3	do ..	4 830	44 30	60	do				
do	do 27	Sept. 2	128	39	do	3	do ..	5 940	46 50	58	do				
do	May 4	do 8	127	50	Fair.	4	do ..	4 150	25 50	51	do				
do	do 11	do 12	124	51	Stiff.	3½	do ..	4 770	25 30	51	do				
Stanley	April 6	Aug. 15	131	40	V'y stiff	3	do ..	4 950	50 50	62	do				
do	do 13	do 21	130	42	do	4	do ..	5 010	49 ..	62	do				
do	do 20	do 28	130	46	do	3½	do ..	5 090	48 30	61	do				
do	do 27	do 31	126	40	do	3	do ..	5 330	42 ..	59½	do				
do	May 4	Sept. 2	121	40	do	3	do ..	5 000	38 20	59	do				
do	do 11	do 4	116	40	do	3	do ..	3 920	36 20	59	do				

Average yield of the six plots of Red Fife Wheat, 38 bush. 15 lbs.
do do Stanley do 44 do 10 do

OATS—EARLY, MEDIUM AND LATE SOWINGS.

(One-tenth acre plots—soil, clay loam.)

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.		Length of Head.	Kind of Head.	Weight of Straw, per acre.		Yield per acre.		Weight per Bushel.	Rusted.
					In.	In.		Lbs.	Bush.	Lbs.	Lbs.		
Abundance	April 6	Aug. 26	142	50	9	Branching	3 270	96 6	38	Slightly.			
do	do 13	do 28	137	51	9	do ..	3 430	90 10	38	do			
do	do 20	do 30	132	50	8½	do ..	3 780	88 28	38	do			
do	do 27	Sept. 1	127	50	8½	do ..	3 280	87 12	38	do			
do	May 4	do 3	122	50	8	do ..	3 420	92 2	36	do			
do	do 11	do 6	118	47	7½	do ..	3 380	99 4	36	do			
Banner	April 6	Aug. 26	142	52	9½	do ..	3 540	95 30	37	do			
do	do 13	do 29	138	51	9	do ..	3 530	96 6	37	do			
do	do 20	do 31	133	50	9	do ..	4 660	104 4	38	do			
do	do 27	Sept. 2	128	50	8½	do ..	4 630	103 18	37	do			
do	May 4	do 4	123	49	8½	do ..	4 210	102 22	37	do			
do	do 11	do 7	119	49	8	do ..	4 690	110 20	37	do			

Average yield of the six plots of Banner oats, 102 bush. 5 lbs.
do do Abundance 92 do 10 do

BARLEY—EARLY, MEDIUM AND LATE SOWINGS.

(One-tenth acre plots—soil, clay loam.)

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, per acre.	Yield per acre.	Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	
Oderbruch.....	April 6	Aug. 18	134	37	Fair ...	3	6-rowed...	4 840	20 —	45	None.
do	do 13	do 18	127	37	do ...	3	do ...	4 251	21 42	47	do
do	do 20	do 18	120	37	do ...	3	do ...	5 770	31 42	48	do
do	do 27	do 18	113	37	do ...	3	do ...	4 150	42 34	49	do
do	May 4	do 18	106	37	do ...	3	do ...	3 220	51 32	50	do
do	do 11	do 21	102	36	do ...	2 1/4	do ...	3 320	64 8	49	do
Canadian Thorpe....	April 6	do 31	147	37	Weak ..	3	2-rowed...	3 610	51 42	47	do
do	do 13	do 31	140	37	do ..	3	do ...	3 360	44 28	47	do
do	do 20	Sept. 2	135	36	do ..	3	do ...	4 110	49 38	48	do
do	do 27	do 3	129	36	do ..	3	do ...	3 640	53 16	48	do
do	May 4	do 4	123	36	do ..	3	do ...	2 010	64 18	48	do
do	do 11	do 6	118	35	do ..	3	do ...	3 730	51 22	47	do

Average yield of the six plots of Oderbruch Barley, 38 bush. 34 lbs.
do do Canadian Thorpe, 52 do 27 do

From the foregoing, as well as from past experience in this series of tests it would appear that nothing is gained by sowing barley or oats very early. That although the first sowing of wheat seldom gives such a large return as that sown a week or two later, the risk from frost is greatly lessened by early sowing. These results show that the Banner oats still maintain their high character for productiveness and they are recommended for general cultivation.

EXPERIMENTS WITH OATS.

The past season being cool and moist was particularly favourable for oats, and the yield in all parts of the province has been large. On this farm the yield of most varieties was above the average, owing, however, to a severe storm on the 8th of August, the grain was badly lodged and many of the varieties were light in weight.

A noticeable feature in this year's test of varieties of oats is the very varying yields, ranging from 101 bushels from Banner, to 41 bushels from Welcome ; this great difference is no doubt largely attributable to smut, which was very bad in some varieties, and not in others. It is proposed in future to treat all oats for smut, which will it is hoped lessen the injury from this cause, it is evident that some varieties are more liable to injury from smut than others.

As heretofore, the Banner heads the list for productiveness, yielding 101 bushels per acre, this variety is very highly spoken of by the oatmeal millers of the province and the Banner is almost exclusively grown in those districts in Manitoba where there is a large demand for a milling oat. This variety is also highly esteemed in the Eastern Provinces. It is noticeable that this variety is not so subject to smut as some others.

Several parties in the Red River Valley having reported large yields from a variety of oats imported from Russia by the Mennonites, a test has been made of them this year, with gratifying results as regards yield, they having given over 96 bushels per acre ; they are however light in weight, and their yellow colour and lean appearance is very much against them. They appear in the list under the name of Mennonite.

White Schonen, favourably mentioned in my last report, has again given a large yield.

Holstein Prolific keeps up its reputation for productiveness and was quite free of smut.

Rosedale, usually one of the most productive, was so badly injured by smut that it only ranks 14th on the list this year.

Several other varieties have this year been tested for the first time, but in such small quantities that the returns are not available, larger plots will be sown of these next season.

OATS—TEST OF VARIETIES.

All sown on 22nd April, on clay loam, and on plots of one-tenth acre each.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.	Rusted.	Smut.
			In.		In.		Lbs.	Bush.	Lbs.		
Banner.....	Aug. 24	124	56	Medium..	8	Branching	4,210	101	6	37	None..... Little
Mennonite.....	do 26	126	48	Very weak	7	do ..	4,010	96	26	35	do do
American Beauty....	do 28	128	59	Weak	10	do ..	4,280	96	6	35	do None.
Holstein Prolific....	do 28	128	53	Stiff.....	9	do ..	4,400	95	20	36	do do
Bavarian.....	do 24	124	49	Weak	9	do ..	4,580	93	8	39	do do
White Schonen.....	do 28	128	56	Medium..	9	do ..	4,980	93	8	35	do Little
Early Golden Prolific	do 28	128	61	Weak	10	do ..	4,630	93	8	36	do None.
Columbus.....	do 28	128	53	Fair	9	do ..	4,080	91	26	34	do do
Golden Giant.....	Sept. 3	134	49	Weak	9	do ..	4,370	90	20	32	do Little
Oderbruch.....	Aug. 28	128	55	Medium..	9	Sided.....	4,220	89	4	38	do do
Wallis.....	do 29	129	58	Weak	8	Branching	4,680	88	18	37	do do
Early Archangel....	do 26	126	54	Very stiff.	8	do ..	4,700	88	8	38	do None.
Siberian.....	Sept. 3	134	49	Weak	8	Sided.....	4,330	87	12	37½	do Little
Rosedale.....	Aug. 22	122	57	do	9	do	4,440	87	2	38	Slightly.... Much
Abyssinia.....	do 28	128	58	Medium..	10	do	3,950	86	26	39½	None..... do
White Russian.....	do 31	131	49	Weak	8	do	5,060	86	16	37	do Little
Early Gothland....	do 31	131	50	do	9½	do	4,520	84	24	38	do do
Golden Beauty.....	do 29	129	56	Stiff	6	Branching	4,050	83	28	36	do None.
Black Tartarian....	Sept. 15	146	39	Weak	6	Sided.....	5,670	83	8	34	do Little
Lincoln.....	Aug. 28	128	54	Medium..	7	Branching	4,420	81	26	37	do None.
Joanette.....	Sept. 5	136	48	Very weak	9	do ..	5,430	81	16	34	Badly..... Little
Improved Ligowo....	Aug. 28	128	56	Medium..	9	do ..	3,580	81	16	38	None..... None.
Flying Scotchman....	do 24	124	55	Very weak	10	do ..	4,390	81	6	38½	Slightly.... Little
Giant Cluster.....	Sept. 3	134	51	Weak	8	Sided.....	3,280	80		34	do do
Early Blossom.....	do 3	134	50	do	8	do	3,200	79	14	37	None..... do
Abundance.....	Aug. 28	128	49	Medium..	8	Branching	3,750	79	14	38	do None.
Coulommiers.....	Sept. 5	136	54	Weak	11	do ..	5,570	77	12	36	Slightly.... Little
Winter Grey.....	Aug. 28	128	58	Medium..	10	do ..	4,580	77	2	40½	None..... Much
Wide Awake.....	Sept. 3	134	48	do	7	do	4,180	77	2	34	Slightly.... Little
California Prolific...	do 15	146	49	Weak	7	Sided.....	4,690	76	26	35	None..... do
Saltzer's Nameless...	Aug. 28	128	51	do	10	Branching	5,190	75	10	34	do None.
Hazlett's Seizure....	do 22	122	53	do	9	do	4,830	74	4	38	Slightly.... Much
Prolific Bl'k Tartarian	Sept. 15	146	39	do	6	Sided.....	4,780	74	4	33	None..... Little
Victoria Prize.....	Aug. 22	122	55	do	9	Branching	4,630	68	8	41	Slightly.... Much
White Monarch.....	do 31	131	48	do	8	do	4,680	68	8	35	None..... Little
American Triumph...	Sept. 3	134	53	do	9	do	2,980	68	8	34	do do
Poland.....	Aug. 22	122	56	do	10	do	4,470	67	2	38	Slightly.... Much
Imported Irish.....	do 21	121	56	Stiff.....	9	do ..	4,380	66	26	38	None..... None.
Scottish Chief.....	do 22	122	54	do	10	do ..	5,040	65		41	Little..... Little
Scotch Hopetown....	Sept. 8	139	60	Very weak	11	do ..	4,400	61	26	34	do None.
Rennie's Prize White.	Aug. 23	123	37	Weak	12	do ..	4,710	61	16	40	Consid'rably Much
Prize Cluster.....	do 22	122	50	Medium..	10	do ..	3,930	60	30	40	None..... do
Early Etampes.....	Sept. 15	146	45	Weak	8	Sided.....	4,230	57	32	33	Slightly.... Little
Doncaster Prize.....	Aug. 28	128	56	Very stiff.	10	Branching	5,230	56	16	35	Very badly.. do
Dunn.....	Sept. 16	147	52	Fair	11	do ..	1,520	55	10	38	None..... None.
White Wonder.....	Aug. 22	122	59	Medium..	10	do ..	4,580	52	2	40	Slightly.... Much
Cream Egyptian.....	do 21	121	51	do	10	Sided.....	4,030	47	22	42	Badly..... V. do
Bonanza.....	do 22	122	47	do	9½	Half sided	4,030	44	24	34	Slightly.... do
Welcome.....	do 20	120	55	do	12	Branching	4,530	41	26	41	Consid'rably V. do

TREATING OATS FOR SMUT.

At no time in the history of the province has there been so much smut among oats as prevailed this year ; some varieties were so badly affected that the yield was reduced by one-half and the threshing made very disagreeable on account of the dust.

Finding in former years that sprinkling of coarse grain with bluestone liquid did not completely prevent smut, a different plan was adopted this year : a very smutty sample of Welcome oats was completely covered for five minutes with a liquid composed of 1 lb. bluestone dissolved in three pails of water.

The accompanying table shows that although this mode of treating a *badly* affected sample of oats did not effectually destroy the smut, it certainly reduced the smutty heads by one-half, and increased the yield by 25 bushels and 20 pounds per acre.

In all probability, with a sample only slightly affected, this mode of treatment would be effectual in preventing injury, and even a *very* smutty sample treated in this manner for several seasons, would, probably in time become free of smut.

The following extract, taken from the Annual Report for 1894, describes the manner of treating large quantities of oats or barley by this method.

A quantity of liquid is prepared, composed of one pound of bluestone dissolved in two pails of water, a coal oil barrel is then three parts filled with the grain and sufficient of the liquid is poured on to just cover the grain. This is allowed to remain for a few minutes only, when the liquid is drawn off through a $\frac{3}{4}$ -inch hole at the bottom of the barrel, and the grain emptied out ; by adding about three-quarters of a pailful each time the same liquid can be used a number of times.

TREATING VERY SMUTTY OATS WITH BLUESTONE.

Name of Variety.	How Treated.	Good heads.	Smutty heads.	Weight of straw per acre.	Yield per acre.	Weight per bush.
				lbs.	bush. lbs.	lbs.
Welcome.	Dipped in bluestone liquid.....	2,473	839	3,930	68. 8	41
"	Not treated	1,841	1,632	3,750	42.22	38

EXPERIMENTS WITH BARLEY.

This grain has yielded unusually well during the past season, but, owing to the rank growth, many kinds were badly lodged, which injured the colour and lessened the weight.

Among the six-rowed varieties Mensury heads the list for productiveness ; this variety was also among the most productive in 1894 ; the light weight of Mensury is largely owing to its persistent beard, which is difficult to remove, and prevents the kernels from lying closely in the measure.

The Hybrid barleys, originated on the Experimental Farms, are this year noticeable for their productiveness and excellent straw ; next to Mensury five of them head the list for yield and four of these have stiff straw. With the rank soil generally found here it is always desirable that the straw should be stiff, but its importance was emphasized this year when all the two-rowed and many of the six-rowed varieties were badly lodged.

The two-rowed varieties of barley are as a rule weaker in the straw than the six-rowed sorts and for that reason they should, when practicable, be sown on lighter soils where the growth would be shorter.

BARLEY—SIX-ROWED, TEST OF VARIETIES.

All sown on 15th May, soil, rich loam, size of plots $\frac{1}{16}$ acre each. There was no rust on any of these plots.)

Name of Variety.	Date of Ripening.	No. of days maturing	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	Weight per Bushel.	Smut.
			In.		In.		Lbs.	Bush. Lbs.	Lbs.	
Mensury.....	Aug. 22	99	45	Medium	3 $\frac{1}{2}$	Six-rowed.	4,490	68·46	46	None.
Nugent.....	do 22	99	40	Stiff...	2 $\frac{3}{4}$	do	4,810	68·26	46	Considerable.
Royal.....	do 20	97	36	V'y stiff	2 $\frac{1}{2}$	do	3,950	65·30	49	do
Surprise.....	do 21	98	40	Weak...	2 $\frac{1}{2}$	do	5,270	65·10	48	Little.
Trooper.....	do 20	97	40	V'y stiff	3 $\frac{1}{2}$	do	3,970	65·10	50	do
Vanguard.....	do 18	95	39	Stiff...	2 $\frac{1}{2}$	do	3,820	64·8	50	do
Common.....	do 19	96	40	Weak...	2 $\frac{1}{2}$	do	4,570	63·6	49 $\frac{1}{2}$	do
Odessa.....	do 21	98	40	Medium	3	do	4,760	60·10	45 $\frac{1}{2}$	None.
Summit.....	do 22	99	37	V. weak	2 $\frac{1}{2}$	do	4,970	58·46	46	Little
Baxter's.....	do 20	97	37	Medium	2	do	3,920	57·44	48	Considerable.
Petschora.....	do 17	94	38	Weak...	2 $\frac{1}{2}$	do	3,670	56·42	48	Little.
Stella.....	do 28	105	39	Fair...	3	do	3,020	53·36	50	None.
Phoenix.....	do 19	96	39	Medium	2	do	4,120	51·32	49	Considerable.
Rennie's Improved.....	do 18	95	38	V. weak	2	do	4,720	51·32	47	do
Oderbruch.....	do 20	97	39	Weak...	2	do	4,050	48·46	49	do
Champion.....	do 11	88	41	Stiff...	3	do	4,190	48·6	40	None.
Excelsior.....	do 11	88	41	do...	3	do	4,500	47·44	39	do
Success.....	do 10	87	33	do...	2	do	4,150	30·10	40	do

BARLEY—TWO-ROWED, TEST OF VARIETIES.

French Chevalier.....	Aug. 26	103	41	Medium	4	Two-row'd	4,310	62·14	48	None.
Emerson.....	do 27	104	49	do	2	do	3,940	61·32	48	do
Sidney.....	do 28	105	39	Fair...	5	do	3,111	60·9	47	do
Canadian Thorpe.....	do 27	104	39	Weak...	4 $\frac{1}{2}$	do	2,850	58·16	46	do
California Prolific.....	do 27	104	40	do..	3	do	3,900	57·14	47	do
Duck-bill.....	do 23	100	41	do..	3	do	3,860	57·4	47	do
Newton.....	do 26	103	41	Fair...	3	do	4,010	56·2	47	do
Beaver.....	do 28	105	38	V. weak	4	do	4,490	50·10	49	do
Kinver Chevalier.....	do 28	105	38	do	4	do	3,710	45·30	47	do
Thanet.....	do 26	103	38	Weak...	4 $\frac{1}{2}$	do	3,190	43·46	47	do
Prize Prolific.....	do 26	103	43	do..	3	do	4,772	42·12	48	do
Danish Chevalier.....	do 27	104	44	do..	4	do	3,560	41·22	48	do

The hybrid varieties in the preceding list are as follows:—Two-rowed, Beaver and Sidney, six-rowed, Royal, Summit, Stella, Vanguard, Nugent, Surprise and Trooper. The parentage of all these varieties is Swedish two-rowed female with Baxter's six-rowed male.

EXPERIMENTS WITH PEASE.

Ten varieties of pease were sown, but the produce of three of the plots was so badly mixed by a wind storm just after they were cut that accurate returns from them were not obtainable. The remaining seven were fortunately all housed before the storm. It will be noticed that the yields are all very large, and the weights exceptionally good. The Pride, a comparatively new variety, is at the head of the list for yield, and the weight per bushel exceeds 65 lbs., but, owing to the testing scales not indicating more than 65 lbs., the exact weight could not be obtained. This pea is of medium size, and had a very handsome appearance.

All were grown on summer-fallowed land, and were sown with a hoe drill at the rate of from 2 to 2½ bushels per acre.

PEASE—TEST OF VARIETIES.

ALL sown 17th May, soil clay loam, size of plots, one-tenth acre each.

Name of Variety.	Date of ripening.	No. of days maturing.	Character of growth.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.	Remarks.
				Inch.		Bush. Lbs.	Lbs.	
Pride	Aug. 22.	97	Rank ..	4	Medium..	68	65	The straw was so badly tangled that average lengths cannot be given; some of it was 8 and 9 ft. long and podded nearly the full length
Crown	do 24.	99	do ..	2	Small	60 50	64	
Potter	do 30.	105	do ..	4	Medium..	56 40	64	
Mummy	Sept. 3.	109	do ..	2	do ..	53 10	65	
Black-eyed Marrowfat.	do 10.	116	do ..	3½	Large	52 ..	64	
Golden Vine	Aug. 28.	103	do ..	2½	Small	46 20	65	
Canadian Beauty	do 29.	104	do ..	3¾	Medium..	39 ..	65	

EXPERIMENTS WITH FLAX.

It is generally supposed that a crop of flax exhausts the fertility of soil very rapidly. With the object of testing this, the plots on which flax was grown in 1894 were this year sown with wheat, oats and barley, two plots being sown with each kind of grain. For comparison, six adjoining plots of wheat stubble were also sown at the same time with wheat, oats and barley.

From the accompanying table it will be seen that in every case but one the flax stubble gave the largest yield, and in each instance the largest average, which would indicate that a flax crop is not as exhaustive as is generally supposed.

TABLE showing the yield of different kinds of grain after flax and after wheat, sown on the stubble and on spring ploughing.

Name of Variety.	Rotation.	How treated.	When sown.	When ripe.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.
					Lbs.	Bush. lbs.	Lbs.
<i>Wheat.</i>							
Red Fife	Following wheat..	Spring ploughed..	April 17	Aug. 21	2,610	24	61
do	do do ..	Not do ..	do 17	do 21	3,280	30 20	61
do	do flax	Spring ploughed..	do 17	do 21	2,780	25 20	61
do	do do	Not do ..	do 17	do 21	3,820	36 20	62
<i>Oats.</i>							
Banner	Following wheat..	Spring ploughed..	April 27	Aug. 23	3,410	76 6	37
do	do do ..	Not do ..	do 27	do 23	4,680	41 26	36
do	do flax	Spring ploughed..	do 27	do 31	3,730	59 14	38
do	do do	Not do ..	do 27	do 31	4,190	63 18	35
<i>Barley.</i>							
Odessa	Following wheat..	Spring ploughed..	May 17	Aug. 15	3,270	42 14	45
do	do do ..	Not do ..	do 17	do 15	3,370	38 6	45
do	do flax	Spring ploughed..	do 17	do 21	3,450	55 10	45
do	do do	Not do ..	do 17	do 21	3,120	47 24	45

SUMMARY as to effect of previous crop.

	Bush.	lbs.
Average yield of wheat after flax.....	30	50
do do wheat.....	27	10
Average yield of oats after flax.....	61	16
do do wheat.....	58	33
Average yield of barley after flax.....	51	17
do do wheat.....	40	10

SPRING PLOUGHING VS. SOWING ON THE STUBBLE.

In connection with the preceding experiment, a test of sowing on the stubble against spring ploughing was made.

The following tables show that with wheat the yield has been best from sowing on the stubble without ploughing, but oats and barley have done best when the land was ploughed, this agrees with our experiment in former years, clean land, that is free of weeds, the second year after fallow, has always given better returns from sowing on stubble than from ploughing, the ploughing in of heavy stubble makes the land too loose for wheat, this is particularly true if the ploughing is done in the fall. But with oats and barley the results are different, and ploughing especially if done in spring has proved best for these cereals.

SUMMARY AS TO THE EFFECT OF PLOUGHING.

	Bush.	Lbs.
Average yield of wheat with ploughing of stubble.....	24	40
" " " without ploughing of stubble.....	33	20
Average yield of oats with ploughing of stubble.....	67	27
" " " without ploughing of stubble.....	52	22
Average yield of barley with ploughing of stubble.....	48	36
" " " without ploughing of stubble.....	42	39

GRASSES AND FODDER CROPS.

GRAIN GROWN FOR HAY.

In sections of the country, at a distance from native hay marshes, the question of a sufficient supply of fodder is an important one. The naturally fertile soil of Manitoba permits, however, of the growing of a number of annual crops suitable for hay, some of which, under proper treatment, will usually yield large returns.

From the accompanying tables it will be seen that summer-fallowed land gave much the largest yield of mixed grain, reaching, in one case, to over five tons of dry hay per acre; this yield is, of course, an exceptional one, and was due to the favourable season and strong land.

In districts where summer-fallowed land has a tendency to produce too rank a growth of wheat straw and delay ripening, it will be found an excellent plan to grow grain for fodder the first year, for if the crop is cut before it has time to lodge, there is no objection to a rank growth in a fodder crop.

It will be noticed in another part of this report, that oat sheaves, cut green, give excellent results as cattle feed, and this crop can be grown and harvested with very little manual labour, an important consideration in this country.

GRAIN GROWN FOR HAY.

Mixture Sown.	How Land was prepared.	Soil.	Size of Plot.	Sown.	Cut.	Weight, dry, per acre.	
No. 1 Mixture.						Tons.	lbs.
1 bush. Golden Vine Pease } 1 do Red Fife Wheat... } 1 do Banner Oats. }	per acre Summer-fallow....	Clay loam.	$\frac{1}{10}$ acre.	May 8.	Sept. 3.	5	100
No. 2.							
1 do Golden Vine Pease } 1 do Prize Prolific Barley } 1 do Banner Oats. }	do ..	do ..	do .	do 8.	do 3.	4	800
No. 3.							
1 do English Tares..... } $1\frac{1}{2}$ do Banner Oats }	do ..	do ..	do .	do 8.	do 3.	4	100
No. 4.							
$2\frac{1}{2}$ do Banner Oats.....	do Spring-ploughed oat stubble.....	do ..	do .	do 13.	Aug. 3.	2	1,700
No. 5							
1 do Spring Rye.. } 1 do Odessa Barley..... }	do ..	do ..	do .	do 6.	do 13.	2	900

EXPERIMENTS WITH MILLETS.

These have been found very useful here in supplementing a light crop of native hay. Millets do not require to be sown until the middle of May, and by that date a very fair idea can be had of the prospects for a crop of wild hay.

Millets of all kinds have given a large yield this year, especially when succeeding a crop of potatoes.

Both fallow and potato land was well harrowed before and after sowing, but not rolled. Sowing was done with a broadcast machine at the rate of 23 pounds per acre; the soil being moist, the plants soon covered the ground, and the plots were very free of weeds, all were cut with a mower; and the weather being favourable, the hay was cured in excellent condition.

As Millet hay was the supposed cause, in former years, of indigestion among the farm horses, it was only fed mixed with wild hay, in the proportion of about half and half; the horses appeared to relish the mixture, and no injurious results were noticed.

This year five varieties of millets were sown being a selection from a number grown in former years.

The Manitoba millet is evidently an early ripening strain of East Indian "Chana" and has very coarse stalks and branching heads.

Golden Millet is very similar in appearance to Common Millet, but is somewhat later in maturing, it was the most productive variety this year.

The Common Millet was grown from seed ripened on this farm las year, the seed was quite free of foul weeds and germinated well.

MILLETS—TEST OF VARIETIES.

Name of Variety.	Size of plot.	When sown.	When cut.	Height.	Stage when cut.	Rotation.	Yield per acre dry.	
				In.			Tons.	Lbs.
Golden Millet	$\frac{1}{10}$ acre	May 5..	Aug. 17.	33	Bloom.....	After potatoes..	3	1,500
White French.....	"	" 5..	" 17.	45	"	" ..	3	1,100
Common.....	"	" 5..	" 17.	32	Water	" ..	3	850
Hungarian.....	"	" 5..	" 17.	33	Head not quite out.	Summer-fallow..	3	900
Common.....	"	" 5..	" 17.	32	Water	" ..	3	
Manitoba.....	"	" 5..	" 21.	47	"	" ..	3	

GRASSES.

In the spring of 1894 a number of varieties of native and imported grasses and clovers were sown with grain, but owing to the dry spring only two varieties became established, these were both natives.

The grasses grown on the two and three year old plots were cut again this year, and weighed, and the accompanying table gives the yields, all were grown on rolling prairie in the valley.

In addition to these plots a large field was sown in 1894, with Awnless Brome grass and wheat, but the seed did not germinate freely, and it was too weedy for an accurate test. The returns given are from the two year old field only.

Timothy has failed to make a catch on the upland for the past two years, so that we have no returns from that class of land, but in a field overflowed each spring, the third crop of Timothy gave a return of $2\frac{1}{2}$ tons per acre, it appears as if this grass is suitable here for low lands or retentive soils, but in other locations it is uncertain.

A considerable quantity of grass seeds have been saved which will be available for distribution or for sale.

YIELD OF GRASSES.

Name of Variety.	Crop.	Size of plot.	Height.	When cut.	Weight per acre dry.	
			Incs.		Tons.	Lbs.
Western Rye Grass (<i>A. tenerum</i>).....	1st.	$\frac{1}{8}$ acre.	18	Aug. 1..	2	1,166
"	2nd.	$\frac{1}{2}$ "	28	" 2..	2	1,215
"	3rd.	$\frac{1}{10}$ "	16	July 17..	1	1,400
Bald Rye Grass (<i>E. virginicus</i>).....	1st.	$\frac{1}{8}$ "	19	" 2..	1	250
"	2nd.	$4\frac{1}{2}$ "	25	" 30..	1	1,755
American Rye Grass (<i>E. americanus</i>).....	2nd.	2 "	26	" 30..	2	1,374
"	3rd.	$\frac{1}{10}$ "	15	" 17..	1	1,000
Awnless Brome Grass (<i>B. inermis</i>).....	2nd.	$\frac{1}{2}$ "	18	" 2..	1	950

EXPERIMENTS WITH CORN.

The cool temperature of the early summer months of the past season greatly retarded the growth of this crop, and the frost of August 20th caught the plants when full of sap, freezing them to within three feet of the ground, materially reducing both the weight and quality of the crop.

STORING DRY FODDER CORN.

The fodder corn crop of 1894, being larger than could be utilized as ensilage, a trial was made of storing it between layers of straw, and with excellent results.

The corn was cut and bound with a grain binder at the usual time, and at once stooked in 300-lb. conical shocks, the top of each shock being tied with a band of binder twine, during November it was stacked by placing a three-inch layer of corn between a foot thick layer of mixed grain straw, these layers were continued until a stack containing about 50 tons was made. On opening the stack in December the corn was found to be well preserved, free from mould, and the straw was strongly impregnated with the odour of the corn, on separating, it was found that the mixture contained 60 per cent by weight of corn, and 40 per cent of straw, when run through the cutting-box the mixture was readily eaten by both cattle and horses.

In the absence of a silo, this mode of preserving fodder corn may be recommended, as it has the following advantages :—

- 1st. The fodder is preserved in good condition.
- 2nd. The expense of a silo is avoided.
- 3rd. The work of stacking is postponed until after the rush of fall ploughing and threshing is over.
- 4th. A portion of the abundant supply of grain straw can thus be made more palatable for both horses and cattle.

FODDER CORN—TEST OF VARIETIES.

All were sown after barley, no manure was used ; soil rich sandy loam ; size of plots, two rows, each one chain long ; sown May 23, with a press drill, drills three feet apart, plants one foot apart in the drill, also in hills 3 feet apart each way ; kept clean with a one-horse cultivator ; cut on September 9th and immediately weighed.

FODDER CORN.—Test of Varieties.

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Name of Variety.	Description of variety.	Height. Inch.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per acre grown	
									in rows	in hills.
									Tons—Lbs.	Tons—Lbs.
Compton's Early.....	Yellow Flint..	68	Fairly leafy	Aug. 12.....	Aug. 20.....	Aug. 25.....	Sept. 1.....	Late milk....	15 800	13 1,500
Red Cob Ensilage.....	White Dent..	75	Few leaves	Sept. 1.....	.....	.....	.....	In tassels....	15 250	12 750
Angel of Midnight.....	Yellow Flint..	65	Fairly leafy	Aug. 13.....	Aug. 20.....	Sept. 1.....	.....	Early milk....	14 600	10 350
Canada White Flint.....	White Flint..	65	Very leafy	do 15.....	do 20 ..	do 1.....	.....	do ..	14 600	12 200
Longfellow.....	Yellow Flint..	65	Fairly leafy	do 13.....	do 20.....	do 1 ..	.....	do ..	14 50	11 1,100
Sanford Flint.....	White Flint..	67	do	do 22.....	.....	.....	.....	In tassels....	13 1,500	11 1,100
Thoroughbred White Flint...	do ..	65	Fair to good	Sept. 1.....	.....	.....	.....	do ..	13 1,500	12 750
Giant Prolific Ensilage Sweet.	White Dent ..	70	Few leaves	Aug. 20.....	Aug. 22.....	.....	.....	In silk.....	13 1,500	13 400
Mitchell's Early	White Flint..	58	Very leafy	do 2.....	do 8.....	Aug. 15.....	Aug. 20.....	Late milk....	13 1,500	12 1,850
New White Cap Yellow Dent.	Yellow Dent..	70	Fairly leafy	do 25.....	.....	.....	.....	In tassels....	12 640	10 900
Mammoth eight-rowed Flint.	Flint.....	70	do	do 14.....	Aug. 20.....	Sept. 1.....	.....	Early milk....	12 200	11 1,650
North Dakota Flint White...	White Flint..	63	Quite leafy	do 7.....	do 12.....	Aug. 22.....	Sept. 1.....	Late milk....	11 1,650	11 1,650
do do Yellow..	Yellow Flint..	62	do	do 7.....	do 20.....	do 22.....	do 1.....	do ..	11 1,100	11 1,100
Canadian Dent	Dent.....	70	Few leaves	do 13.....	do 20.....	.....	.....	In silk.....	11 500	9 1,800
Champion White Pearl Dent.	White Dent..	75	do	do 25.....	Sept. 1.....	.....	.....	do ..	11 500	9 1,250
Pride of Dakota.....	White Flint..	54	Very leafy	do 6.....	Aug. 12.....	Aug. 20.....	.....	Early milk....	11 500	10 1,450
Extra Early Huren Dent.	Yellow Dent..	70	Few leaves	do 15.....	do 20.....	.....	.....	In silk.....	11 900	7 1,400
Minnesota White Flint.....	White Flint..	70	Fairly leafy	do 15.....	do 20.....	Sept. 1.....	.....	Early milk....	10 350	10 350
Minnesota King	Yellow Dent..	70	do	do 12.....	do 20.....	do 1.....	.....	do ..	10 350	9 700
Dakota Dent.....	do ..	70	Few leaves	do 10.....	do 15.....	Aug. 20.....	Sept. 1.....	Late milk....	9 1,800	8 1,050
Pearce's Prolific.....	Yellow Flint..	70	Quite leafy	do 13.....	do 20.....	Sept. 1.....	.....	Early milk....	9 1,800	9 1,250
Country Gentleman.....	White Dent ..	56	Very leafy	do 20.....	.....	.....	.....	In tassels....	9 1,800	5 1,550
Rustler.....	White Dent ..	65	Few leaves	do 15.....	Aug. 20.....	Aug. 24 ..	.....	Early milk....	9 700	9 150

Silos.

The silos continue to give satisfaction, the ensilage from last year's crop proved to be of excellent quality and the silos were again filled this year. The corn was injured by fall frosts, and it will be interesting to note what effect a severe freezing has upon the ensilage made from this crop.

EXPERIMENTS WITH FIELD ROOTS.

The past season was an ideal one for root crops of all kinds, and as a consequence nearly all parts of the province is in the enjoyment of the largest yield known in its history.

INJURIOUS INSECTS.

The turnips on this farm were seriously injured by a small green caterpillar the larva of the Diamond back moth (*Plutella cruciferarum*) which perforated the leaf shortly after the plants were thinned out, this gave them a very serious check from which they never fully recovered.

Complaints of injury to root crops from cut worms, were also common. Information on the life-history of cut-worms will be found in the report of the Entomologist and Botanist in the annual report of the Experimental Farms for 1893.

From the general average given for each sowing of roots it will be seen that the earliest sown have again given the largest average yield.

Since the publishing of the report for 1894, several farmers in the province have tested the sowing of a portion of their root crop earlier than the usual time, and all agree that the yield is largely increased by early sowing.

TURNIPS.

Two new and promising varieties of turnips, were tested for the first time this year, and head the list for productiveness viz., American Purple Top and Cow Horn, the first named has much the appearance of the other purple top varieties, and is apparently a good keeper, the shape of the Cow Horn is similar to the Long Red mangel, it is white in colour and not likely to prove a good keeper.

Yield of turnips sown at two different dates, previous crop carrots, land manured and ploughed in the fall, seed drilled in on flat drills 30 inches apart, soil rich sandy loam, estimate of yield made from product of one row 66 feet long.

The first plots were sown May 22nd the second two weeks later, all were pulled October 5th.

Name of Variety.	Yield per Acre, 1st Sowing.		Yield per Acre, 1st Sowing.		Yield per Acre, 2nd Sowing.		Yield per Acre, 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
American Purple Top.....	23	464	774	24	19	280	638	....
Cow Horn.....	23	200	770	....	23	728	778	48
Jumbo or Monarch.....	21	1560	726	....	13	400	440	....
Purple Top Swede.....	18	432	607	12	14	1040	484	....
Carter's Elephant.....	17	1376	589	36	11	440	374	....
Skirvings Swede.....	17	320	572	....	15	360	506	....
Hartleys Bronze.....	17	320	572	....	14	776	479	36
East Lothian.....	14	1568	492	48	13	928	448	48
Lord Derby.....	14	1304	488	24	11	704	378	24
Rennie's Prize Purple Top.....	13	1720	462	....	13	400	440	....
Champion Purple Top.....	13	400	440	....	11	440	374	....
Imperial Swede.....	12	552	409	12	13	400	440	....
Elephants Master.....	10	328	338	48	12	1080	428	....

				Bush.	Lbs
Average yield from all the sowings of 22nd May, per acre				557	6
do	do	8th June	do	477	39

MANGELS.

These very useful roots have this year given the largest returns in the history of the farm; the Mammoth Long Red as usual heading the list with a yield of 1,214 bushels per acre, from the first sown plot; the roots were also of first rate quality.

We find that the mangel is less liable to injury from insect enemies than the turnip, and the roots can be fed at any time without risk of injury to the flavour of milk.

Yield of mangels sown at two different dates, the first set of plots were sown May 22nd and the second on June 8th, all were pulled September 30th, sown after turnips on rich sandy loam; land manured and ploughed in the fall; sown on flat drills 30 inches apart.

In every case the first sown gave the largest yield. The yields have been estimated from the product of one row 66 feet long.

Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth Long Red (Evans).....	36	864	1214	24	28	1024	950	24
Giant Yellow Intermediate.....	31	304	1038	24	19	544	642	24
Conqueror Yellow Globe.....	30	456	1007	36	21	1560	736	
Gate Post.....	30	192	1003	12	23	1256	787	36
Canadian Giant.....	29	1400	990		26	1856	897	36
Mammoth Long Red (Webb).....	23	1024	950	24	26	800	880	
“ (Sharpe).....	25	1744	862	24	21	1560	736	
Red Flashed Tankard.....	25	160	836		22	1672	761	12
Golden Tankard.....	24	1632	827	12	23	992	783	12
Champion Yellow Globe.....	22	1408	756	48	16	1528	558	48
Red Globe.....	21	1032	717	12	15	1680	528	
Warden Prize Orange Globe.....	20	128	668	48	14	1568	492	48
Yellow Flashed Tankard.....	19	1864	664	24	15	1152	519	12

		Bush.	Lbs.	Per Acre.
Average yield from all the sowings of 22nd May.....		778	26	
“ “ “ 8th June.....		713	19	

SUGAR BEETS.

These roots are found to be very useful for feeding purposes, especially for calves, by which they are preferred to any other roots.

Yield of sugar beets sown at two different dates on rich sandy loam treated the same as mangels. The first plots were sown on May 22nd and the second on June 8th. All were pulled on Sept. 30th; the yield has been calculated from the produce of one row, 66 feet long.

Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Vilmorin's Improved.....	21	1296	721	36	15	888	514	48
German White Sugar.....	19	1072	651	12	14	248	470	48
Austrian Electoral.....	19	808	646	48	18	960	616	
French White.....	17	320	572		11	1232	387	12
Klein Wanzleben.....	17	320	572		16	472	541	12
do from Calgary.....	14	1832	497	12	14	1304	488	24

		Bush.	Lbs.	
Average yield from all the sowings of 22nd May.....		610	8	per acre.
“ “ “ 8th June.....		503	4	“

CARROTS.

During the long winters here when horses are often confined to the stables with very little exercise, carrots furnish a ration which is very beneficial, and one greatly relished by the horses.

Until very deep fall-ploughing was adopted the yield of field carrots here was quite small. The plan now adopted is to spread the manure, and plough the land ten inches deep in the fall; then harrow and roll. In the spring the land is simply harrowed. As will be seen from the returns of this and last year, the yield is now quite large.

Yield of carrots sown at two different dates on rich sandy loam deeply ploughed, the previous crop was turnips, sown in flat drills 18 inches apart. The first plots were sown on May 21st and the second June 8th. All were pulled October 3rd. The yields have been calculated from the product of one row 66 feet long.

Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth White Intermediate.....	18	1840	630	40	11	440	374	
Improved Half Long White.....	17	320	572		11	880	382	20
do Short White.....	15	360	506		13	840	447	20
Giant Short White Vosges.....	14	600	476	40	14	600	476	40
Iverson's Champion.....	14	600	476	40	10	680	344	40
Early Gem.....	11	1760	396		13	1720	462	
Carter's Orange Giant.....	11	1760	396		15	360	506	
White Belgian Selected.....	11		366	40	15	360	506	
Yellow Intermediate.....	10	680	344	40	6	1200	220	
Scarlet do	10	240	337	20	9	40	300	40
Long Orange or Surrey.....	9	480	308		11	440	374	
Long Scarlet Altringham.....	9	40	300	40	9	480	308	

		Bush.	Lbs.	
Average yield from all sowings of 21st May	425	56	per acre.	
8th June.....	391	55	"	

SUMMARY.

- 1st. All field roots should be sown as early as spring frosts will permit.
- 2nd. Land for carrots should be ploughed not less than eight inches deep.
- All classes of live stock are benefited by a few roots in winter.

POTATOES.

The past season has been a favourable one for all kinds of root crops, and the yield of potatoes is above the average, both in quantity and quality.

Owing to the late arrival of some of the varieties, planting of the uniform test plots was delayed until the 28th May, fully two weeks too late, for this district: on this account very few of the varieties were fully matured when fall frosts set in, and the yields were lessened.

Sixty-three varieties were planted and of these twenty-five were new sorts. None of these new varieties have proven equal, in both quality and productiveness, to some of the older sorts, but they will probably improve when fully acclimatized.

Carman's No. 1 is the most productive of the new sorts, but this year it was poor in quality.

Not a rotten potato was found in any of the plots and very little scab.

POTATOES, test of Varieties.

All planted 28th May, on rich sandy loam; dug 28th Sept. The yield per acre has been estimated from the product of one row, 66 feet long.

Name of Variety.	Average Size.	Quality.	Total Yield per Acre.	Yield per Acre of marketable.	Yield per Acre of Unmarketable.	Colour.
			Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	
Pearce's Extra Early.....	Med. to large	Fairly good..	403 20	385	18 20	Light pink.
Early Norther.....	Small to med	Wet, poor..	392 20	344 40	47 40	"
Pearce's Prize Winner.....	Med. to large	Dry, good..	381 20	355 40	25 40	White.
Polaris.....	" ..	do ..	374	344 40	29 20	"
Carman's No. 1.....	" ..	Wet, poor..	374	348 20	25 40	"
Thorburn.....	" ..	Dry, good..	363	344 20	18 20	Dark pink.
Sharpe's Seedling.....	" ..	" ..	363	355 40	7 20	Light pink.
Lee's Favourite.....	" ..	Fair, good..	363	348 20	14 40	"
Early Harvest.....	" ..	Dry, good..	359 20	333 40	25 40	White.
Crown Jewel.....	" ..	" ..	355 40	348 20	7 20	Light pink.
Dreer's Standard.....	" ..	" ..	352	341	11	White.
Early Rose	" ..	" ..	352	337 20	14 40	Light pink.
Everett.....	" ..	Yellow, good	348 20	330	18 20	Dark pink.
Empire State.....	" ..	Wet, poor..	341	322 40	18 20	White.
World's Fair.....	Small to med	Dry, good..	333 40	311 40	22	"
Early Six Weeks.....	Med. to large	" ..	333 40	319	14 40	Pink.
Pride of the Market.....	do ..	Fair.....	330	315 20	14 40	White.
Northern Spy.....	Small to med	Good.....	362 20	304 20	22	Dark pink.
Early White Prize.....	Med. to large	Dry, good..	326 20	308	18 20	White.
Pride of the Table.....	Small to med	Wet, poor..	322 40	308	14 40	Dark pink.
Burpee's Extra Early.....	Med. to large	Dry, good..	322 40	304 20	18 20	Light pink.
Henderson's Late Puritan..	" ..	" ..	322 40	311 40	11	White.
Early Puritan.....	" ..	" ..	319	308	11	"
Great Divide.....	" ..	Damp.....	319	308	11	"
Ideal.....	" ..	Fairly good..	315 20	304 20	11	Pink.
Troy Seedling.....	Small to med	Wet, poor..	311 40	271 20	40 20	White.
New Queen.....	" ..	Dry, good..	311 40	282 20	29 20	Light pink.
Early Ohio.....	Med. to large	" ..	308	289 40	18 20	"
Freeman	Small to med	Fairly good..	304 20	289 40	14 40	White.
Money Maker.....	Large	Wet, poor..	300 40	282 20	18 20	"
Puritan, C. E. F.	Small to med	Dry, good..	297	275	22	"
State of Maine.....	" ..	" ..	293 20	271 20	22	"
Daisy.....	Large	Fair.....	293 20	275	18 20	Light pink.
London.....	Med. to large	" ..	289 40	264	25 40	"
Dakota Red.....	Medium.....	Dry, good..	289 40	286	3 40	Red.
Nameless No. 3.....	Large	Fair.....	287 50	286	1 50	Light pink.
Clark's No. 1.....	" ..	Dry, good..	286	275	11	"
Rochester Rose.....	Med. to large	" ..	282 20	264	18 20	Dark pink.
Lizzie's Pride.....	" ..	" ..	278 40	271 20	7 20	Light pink.
Wonder of the World.....	" ..	" ..	276 40	262	14 40	"
Blue Nose.....	Small to med	Wet, poor..	276 40	225 20	51 20	Dark pink.
Irish Daisy.....	" ..	" ..	275	245 40	29 20	White.
Beauty of Hebron.....	Large	Dry, good..	271 20	249 20	22	Light pink.
Algoma No. 1.....	Medium.....	" ..	271 20	238 20	33	"
I. X. L.....	Med. to large	Wet, poor..	271 20	253	18 20	"
Lightning Express.....	Small to med	Dry, good..	264	253	11	Dark pink.
Early Sunrise.....	Med. to large	" ..	263	252	11	Light pink.
Maggie Murphy.....	Medium.....	Fair.....	262 10	253	9 10	"
Nameless No. 1.....	Large	Dry, good..	262	247 20	14 40	"
American Beauty.....	Medium.....	" ..	262	254 40	7 20	"
White Beauty.....	Med. to large	" ..	260 20	242	18 20	White.
Harbinger.....	Small	Wet, poor..	253	128 20	124 40	Pink.
Rural Blush.....	Medium.....	Fair.....	249 20	227 20	22	Dark pink.
Holborn Abundance.....	" ..	Wet, poor..	245 40	234 40	11	White.
Brownell's Winner.....	Med. to large	Damp.....	223 40	212 40	11	Red.
Prize Taker.....	Small to med	Dry, good..	210 50	187	23 50	Light red.
Wonderful Clay Rose.....	" ..	" ..	205 20	179 40	25 40	"
Peerless Junior.....	Med. to large	Little damp.	190 40	176	14 40	White.
Victor Rose.....	" ..	Dry, good..	176	172 20	3 40	Pink.
Stourbridge Glory.....	Small	Wet, poor..	172 20	132	40 20	"
Record.....	" ..	Fair.....	139 20	121	18 20	White.
Orphans	" ..	Wet, poor..	113 40	110	3 40	"
Nameless No. 2.....	Large	Wet, poor..	97 10	95 20	1 50	Light pink.

AVERAGE YIELD OF POTATOES DURING THREE YEARS.

Potatoes are among the most variable of crops and it is impossible to reach a conclusion regarding the merits of a variety from one year's results.

Twenty-six of the varieties named have been tested for three successive years, and the average yield and quality are here given.

With some sorts such as Sharpe's Seedling, Lee's Favourite and Early Rose, the quality is always good, other varieties such as Prize Winner and Polaris vary in quality with the season, the drier the season the better the sample.

The three varieties which have given the most general satisfaction when distributed are Sharpe's Seedling, Lee's Favorite and Early Ohio. The last mentioned is specially valuable for early use, it being by far the earliest potato tested here.

Name of Variety.	Dryness.	Flavour.	Average Yield per Acre of Three years Tests.	
			Bush.	Lbs.
Pearce's Prize Winner.....	Varies.....	Varies.....	264	40
Everett.....	Dry.....	Good.....	255	20
Polaris.....	Varies.....	Varies.....	249	40
Sharpe's Seedling.....	Dry.....	Good.....	243	40
Lee's Favourite.....	do.....	do.....	231	
Daisy.....	Fair.....	Fair.....	229	40
Crown Jewel.....	Dry.....	Good.....	228	40
Pearce's Extra Early.....	do.....	do.....	224	40
Early Rose.....	do.....	do.....	222	20
Burpee's Extra Early.....	do.....	do.....	221	
Dakota Red.....	Varies.....	Varies.....	217	40
Freeman.....	do.....	do.....	216	
Northern Spy.....	Wet.....	Poor.....	212	20
Chicago Market.....	Varies.....	Varies.....	210	20
Algoma No. 1.....	Dry.....	Good.....	208	
Holborn Abundance.....	Wet.....	Poor.....	206	
Empire State.....	do.....	do.....	205	
Early Puritan.....	Fair.....	Fair.....	204	20
State of Maine.....	Varies.....	Varies.....	201	20
Early Ohio.....	Dry.....	Good.....	201	
I. X. L.....	Wet.....	Poor.....	200	40
Harbinger.....	Varies.....	Varies.....	196	40
Lizzie's Pride.....	Dry.....	Good.....	188	
Early Sunrise.....	do.....	do.....	180	20
Clarke's No. 1.....	Fair.....	Fair.....	171	
Rural Blush.....	do.....	do.....	151	40

TREATING POTATO SEED FOR SCAB.

Of late years many kinds of fungous diseases attacking farm produce have increased surprisingly, of these potato scab has perhaps made the greatest headway here: so prevalent was it in 1894 that it was almost impossible to find in this part of the province a sample of potatoes perfectly free from it.

This disease not only injures the appearance of the tuber but entails some loss in its removal.

In this experiment, three plots were planted with very scabby Early Rose potatoes. The whole tubers in plot No. 1 were treated with a solution of corrosive chloride of mercury (corrosive sublimate), made by dissolving 2 oz of corrosive sublimate in fifteen gallons of cold water; the potatoes were allowed to stand in this liquid for 2 hours, drained, then cut into two eye sets and planted.

Plot No. 2, was planted with potatoes treated with a liquid composed of 1 lb. of Bluestone (sulphate of copper) dissolved in three pails of water, the whole tubers were immersed for 2 hours in the liquid then cut up and planted.

Plot No. 3, was planted in the same manner with the untreated tubers. The following table gives the yield per acre and the per cent of scabby and clean potatoes : it will be seen that none of the treated potatoes were seriously affected, in fact none would have been considered scabby by the average purchaser.

The bluestone treatment was found to seriously injure the germination of the seed potato, and only about 40 per cent grew, hence the small yield. Next year it is proposed to add lime to the bluestone to lessen its caustic effects.

The produce of the untreated potatoes were the largest tubers, but all were more or less scabby.

The size of the plots, was one row, 66 feet long. The land had never been used for potatoes before.

How Treated.	Per cent Very Scabby	Per cent Slightly Scabby.	Per cent Clean.	Yield per Acre Marketable.		Yield per Acre Un- marketable.		Total Yield per Acre.	
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
No. 1. Corrosive sublimate treatment..	None.	51	49	247	20	14	50	262	10
No. 2. Bluestone treatment	do	52	48	95	20	1	50	97	10
No. 3. Not treated	51	44	None.	268	..	1	50	267	50

Although the corrosive sublimate treatment did not completely eradicate the scab, the injury was very slight. The treatment with bluestone was nearly as effective in preventing scab as the corrosive sublimate ; but the germination of the tubers was so badly injured that the crop was greatly reduced. Corrosive sublimate is a virulent poison when swallowed by man or beast, and great care should be used to prevent accidents, but no injury results from handling the fluid of the strength given in the formula.

CATTLE.

The cattle on the farm have been healthy during the year, and there has been no losses through sickness.

Since my last report we have received from the Experimental Farm at Indian Head one Shorthorn bull, also one Ayrshire bull from the Central Experimental Farm, Ottawa. The herd now consists of the following :—

Shorthorns.—1 bull, 1 heifer.

Ayrshires.—1 cow, 1 bull.

Holsteins.—1 cow, 1 bull, 1 bull calf, 1 heifer.

Polled Angus.—1 bull.

Grades.—2 cows, 1 heifer, 2 calves.

In addition to these, eight steers were bought last fall for feeding experiments, and re-sold this spring for the English market.

FEEDING CATTLE.

The export of beef cattle from Manitoba and the North-west has increased surprisingly this year ; it is estimated by good authorities that 45,000 head were shipped out of the North-west, an increase of fully fifty per cent over any previous year.

The chief complaint made by cattle exporters is that they find great difficulty in buying well matured stall fed cattle in the spring and early summer months, later in the season the ranch cattle are fit to ship, but stall fed cattle are the only ones in condition to export in the early part of the season.

This is the Manitoba farmer's opportunity, with abundance of cheaply raised fodder and coarse grain, a healthy climate, and abundant leisure in winter, they have everything to assist them in making cattle feeding a success, and only necessity should induce a farmer to sell lean cattle, especially in the fall.

An error commonly made in this country, where grain is so plentiful, is to feed too much grain in the ration, with the result that a large proportion passes through the animal undigested, and is so much waste, with a well balanced ration, from 6 to 10 lbs. of grain per day is all that can be utilized by a 1100 lb. steer.

To succeed with stall fed cattle they must be kept in a healthy condition which is readily known by a loose hide, and silky hair, this is best maintained by feeding a well balanced ration.

In view of the importance of this industry a test was made last winter of feeding one pair of steers with native wild hay, ensilage and grain, and a second pair with oat sheaves, ensilage and grain, the steers which were very evenly matched, were Short-horn grades, purchased from neighbouring farmers in February at 2 cents per lb., live weight, and sold for export in May at 4 cents per lb. live weight, these were the prevailing prices at the seasons mentioned.

The four steers were divided into as nearly matched pairs as possible and fed for 72 days all they would eat clean of the following rations.

FIRST PAIR OF STEERS.

Cut native hay	20 lbs.
Corn ensilage.....	30 "
No. 3 frozen wheat chop.....	5 "
Barley chop.....	2 "

SECOND PAIR OF STEERS.

Oat sheaves cut.....	20 lbs.
Corn ensilage.....	30 "
No. 3 frozen wheat chop.....	5 "
Barley chop.....	2 "

The oat sheaves were cut just as the top-most oat in the head was turning brown ; both hay and oat sheaves were run through a straw cutter ; and the grain was all ground.

FEED CONSUMED.

The total amount, and estimated value of the feed consumed during the feeding period (72 days) was as follows :—

FIRST PAIR OF STEERS.				\$	cts.
2,710 lbs.	cut native hay	at \$5.00 per ton.....		6	77
4,129 "	corn ensilage	" 2.00 " "		4	12
814 "	wheat chop	" ½ cent per lb.....		4	07
334 "	barley chop	" 20 cents per bushel.....		1	39
				<hr/>	
				\$16 35	
SECOND PAIR OF STEERS.				\$	cts.
2,310 lbs.	oat sheaves	at \$7.50 per ton.....		8	67
3,792 "	corn ensilage	" 2.00 " "		3	79
702 "	wheat chop	" ½ cent per lb.....		3	51
289 "	barley chop	" 20 cents per bushel.....		1	20
				<hr/>	
				\$17 17	

SUMMARY OF RESULTS.

Summary of results.	First cost of steers.	Value of feed.	Price sold for.	Profit.	Daily gain of each steer.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	Lbs. oz.
First pair of steers, hay, ensilage, wheat, barley..	44 70	16 35	99 20	38 15	1 11
Second " oat sheaves, ensilage, wheat, barley	43 10	17 17	98 20	37 93	2 1

For a farmer to sell lean cattle at any season means a heavy loss, more especially in the fall, when prices are low and opportunities for stall feeding good. The feeder may make from 50 to 100 per cent. profit in a few months on the carcass which took the farmer nearly three years to raise. This is done by improving the quality of the meat, or as it is generally called "ripening" the steer. The feeder also gets paid well for the additional flesh put on the animal during the winter. Exporters are always anxious to buy at good prices a well fed ripe steer, but will not purchase lean stock.

Where native hay is not procurable, oat sheaves cut before ripe, makes an excellent substitute. The yield of dry oat sheaves on this farm ran from two and a half to four tons per acre this year.

FEEDING OF MILCH COWS

FODDER CORN AND STRAW COMPARED WITH NATIVE HAY.

In another part of this report, mention is made of the successful curing of fodder corn by stacking it between layers of straw. A test of the suitability of the mixture for feeding to milch cows was made during the past year.

The feeding experiment was conducted in three periods, for the first sixteen days the fodder corn mixture was fed as roughage, for the next period of thirty-eight days native hay was used, and the corn mixture was again used for the third period of sixteen days, this plan was necessary owing to the natural shrinkage of the milk flow as the calving period approached.

The corn mixture was composed of 60 per cent of fodder corn and 40 per cent of straw.

The native hay used was of good quality, well cured, and consisted principally of Native Red Top (*Poa serotina*.)

The cows used for the experiment were Dandy, a pure bred Aryshire, and Leda a pure Holstein.

The rations or proportion in which the feed was mixed were as follows :—

Corn Ration.

Fodder corn and straw.....	40 lbs.
Corn ensilage.....	60 "
Wheat chop No. 1 hard.....	10 "
Barley chop.....	4 "
	<hr/>
	114 lbs.
	<hr/>

Hay Ration.

Native marsh hay.....	40 lbs.
Corn ensilage.....	60 "
Wheat chop No. 1 hard.....	10 "
Barley chop.....	4 "
	<hr/>
	114 lbs.
	<hr/>

As much of the above mixtures as they would eat up clean was fed at three meals each day.

FOOD CONSUMED AND MILK PRODUCED.

Average amount of food consumed daily during corn feeding period by the two cows :—

Fodder Corn.	Ensilage.	Wheat.	Barley.
	Lbs. oz.	Lbs. oz.	Lbs. oz.
36 lbs. 12 oz.....	51 13	9 6	3 12

Average amount of food consumed daily during hay feeding period by the two cows :—

Native Hay.	Ensilage.	Wheat.	Barley.
	Lbs. oz.	Lbs. oz.	Lbs. oz.
34 lbs. 14 oz.....	54 3	9 3	3 10

Average daily yield of milk for two cows with corn feed, 42 pounds 2 ounces.

Average daily yield of milk for two cows with hay feed, 41 pounds 5 ounces.

From the results of this experiment it would appear that farmers living at a distance from hay marshes may find fodder corn a good substitute for hay in feeding cows.

SWINE.

NEW PIGGERY.

A frame building for this purpose, 24 feet by 40 feet, has been erected during the year.

The building is on a stone foundation and is double boarded inside and out, with building paper between each layer of boards.

The interior is divided into seven pens 10 x by 10 feet, and a feed room of the same size ; a passage four feet wide runs through the centre with gutters on each side for the liquid manure.

The feed troughs and other interior fittings are similar to those shown on page 59 of the Experimental Farms Report for 1890, and seem to be very suitable for the purpose.

There are four yards, each 10 x 64 feet on the south side of the building, for sows ; and three yards each 13 x 50 on the north side for boars.

So far the building and yards have proved very satisfactory and convenient for the purpose.

The amount of coarse grain exported from Manitoba to the Eastern Provinces and fed there to swine is very large, and increasing each year. A considerable part of the cured meat is shipped back into this province, necessitating the paying of freight charges each way, this represents a heavy drain on the people which should as far as possible be avoided.

With the object of testing the value of home grown products as pig feed, and also for the purpose of testing the suitability of the different breeds of swine for the climate, a pair of young pigs of each of the following breeds, have been imported from Ontario.

One Berkshire Boar, Barron—3560, bred at the Central Experimental Farm, Ottawa.

One Berkshire Sow, Christie—4140, bred by J. G. Snell & Bro., Edmonton, Ont.

One Tamworth Boar, Major—388, bred at the Central Farm, Ottawa.

One Tamworth Sow, Amber Belle—457, bred by John Bell, Amber, Ont.

One Improved Yorkshire Boar, Oak Lodge Maxum, No. 2,131 bred by J. E. Brethour, Burford, Ont.

One Improved Yorkshire Sow, Sunflower—2071, bred at Central Farm, Ottawa.

POULTRY.

The breeds kept during the past year were Barred Plymouth Rocks, White Leghorns, Black Minorcas and common barn-yard fowl.

Owing no doubt to a liberal use of ground green bone no soft-shelled eggs were laid.

Beef heads were largely used for bone, these were ground during winter with a bone cutter driven by wind power ; in a moderate breeze, 60 lbs. per hour can be finely ground, during winter. 1 ounce per day is fed to each fowl.

POULTRY FOOD.

Soft food consisting of half boiled roots and half ground wheat, wet with skim milk, is fed in the morning, dry grain is used in the evening, this generally consists of 25 per cent of barley, 25 per cent of oats and 50 per cent of wheat, a liberal allowance of lettuce is fed during summer and is much relished.

Fresh water, lime and grit were kept constantly before the fowls, and the dry grain being scattered among chaff ensures plenty of exercise.

HATCHING.

Hens only were used for hatching. The first chickens were hatched on 25th April and the last on the 9th of July. These late chicks were not well feathered when cold weather set in, and the latter date is too late for hatching chickens in this country.

The White Leghorn eggs were the most fertile, closely followed by Black Minorca and Plymouth Rock.

Thirty-six chicks of White Leghorns, 12 Black Minorcas and 40 Plymouth Rocks were raised. The White Leghorn chicks feathered very quickly and for that reason are the easiest to raise. The Black Minorca come next, while the Plymouth Rock, being very slow to feather, have a higher death rate as chicks, but are very healthy after full feathering.

Ready sale has been found for all the surplus stock of poultry raised on the farm.

All breeds have been very free from disease. There were two cases of "crop bound" among the White Leghorns. The crops were cut open, cleaned, and then sown up, and when the disease had not progressed too far, the fowls recovered.

EGGS.

The following table gives the average number of eggs obtained each month from each hen of the different breeds, when kept in confinement. No doubt the eggs would be more numerous if the birds were allowed full range.

The bottomless nest spoken of in my last report was again successful in preventing egg eating. I find that this vice is very prevalent throughout the province. At a season when eggs are high priced, this might be avoided by using the proper kind of nest.

Breed.	December, 1894.	January, 1895.	February.	March.	April.	May.	June.	July.	August.	September.	Total.
	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.
Barred Plymouth Rock.....	1 ³ / ₁₀	3 ⁴ / ₁₀	4 ⁷ / ₁₀	6 ³ / ₁₀	18 ³ / ₁₀	20 ⁷ / ₁₀	16 ⁴ / ₁₀	12 ¹ / ₁₀	16 ⁸ / ₁₀	12 ¹ / ₁₀	112 ³ / ₁₀
White Leghorn.....	4 ⁹ / ₁₀	8 ⁷ / ₁₀	6	13 ⁵ / ₁₀	21	22 ⁴ / ₁₀	20 ⁴ / ₁₀	14 ² / ₁₀	9 ² / ₁₀	1	120 ⁷ / ₁₀
Black Minorca ....	.....	.....	2 ³ / ₁₀	14 ³ / ₁₀	20 ⁹ / ₁₀	20 ⁹ / ₁₀	17 ⁸ / ₁₀	14	7	2	98 ⁴ / ₁₀

The following are the live weights reached by fowls of the different breeds :—

Name of Breed.	Age.		Weight.	
	Months.	Lbs.	Oz.	
Barred Plymouth Rock, cock.....	17	9	8	
do cockerel.....	5 ¹ / ₂	5	4	
do hen.....	17	6	3	
do pullet.....	5 ¹ / ₂	4	4	
Black Minorca, cock.....	17	7	..	
do cockerel.....	6	5	4	
do hen.....	17	4	3	
do pullet.....	6	3	8	
White Leghorn, cock.....	14	4	12	
do cockerel.....	6	4	8	
do hen.....	14	3	8	
do pullet.....	6	3	..	

TABLE FOWLS.

Although the White Leghorns are excellent layers they are under weight for table fowl, and having prominent breast bones their shape is also against them for that purpose. The Plymouth Rocks sell readily as table fowls. The Black Minorcas appear to be in many respects midway between the White Leghorns and Plymouth Rocks.

APPLES.

No success can yet be reported in the cultivation of standard apples on this farm. Of the varieties of Russian origin, which were planted in 1889 and succeeding years, many are still alive, but each year are severely killed back. Even the trees planted under the protection of the forest tree shelter belt, and where each winter they are almost entirely covered by snow, are nearly all dead.

The two Peerless apple trees from O. F. Brand, of Faribault, Minnesota, planted in 1894, although tested under very favourable circumstances, have nothing to recommend them for this province, they were killed to the snow line last winter.

Below will be found a list of trees which have survived, of those tested, but these are all killed to the snow line each winter, and the chances of their bearing fruit seems very small :—

Anis Red.
Anis Yellow.
Antonovgka.
Ben Davis.
Canada Baldwin.
Duchess of Oldenburg.
Wealthy.
Little Hat.
Saccharine.
Borsdorf.
Winter Stripe.

Grandmother.
Liebig.
Switzer.
Winter St. Lawrence.
German Calville.
Silken.
Gipsy Girl.
Sugar Sweet.
Silken Leaf.
White Pigeon.

CRAB APPLES.

The same may be said of the crabs as of the standard apples : very little success can be reported. Some of the Transcendants and other varieties are still alive, but only one is in any way promising.

Sixty Yellow Siberian crab seedlings are doing remarkably well. The seed of these was obtained from the Central Experimental Farm, Ottawa, in 1893. These appear to be, so far, quite hardy, and their development will be watched with interest.

WILD CRAB OF SIBERIA.

The wild Siberian crab (*Pyrus baccata*) received here from the Central Experimental Farm at different times, has not been injured in the slightest degree by frost. There are one hundred of these trees now growing on the farm, seven of which have proved hardy after a test of five years. Ten trees are growing from seed, the seed was obtained from Ottawa in the spring of 1893, these are now vigorous young trees about 24 inches high.

The following additional varieties of *Pyrus baccata* are also being tested, and they all appear to be quite hardy, viz. :—*Sanguinea*, *Macrocarpa*, *Cerasiformis*, *Prunifolia*, and *Aurantiaca*.

PLUMS.

The native plum trees planted in 1890, were again loaded with fruit this year, which appears to improve somewhat in flavour under cultivation.

Some trees obtained from the Brandon Hills in 1893, bore also a fair crop of fruit, on these the fruit was not uniform in quality. The trees bearing the best fruit were marked for future propagation.

The orchard containing the following seedling trees, received from the Central Farm at Ottawa, and planted in 1893, has done well. It contains 127 seedlings of Weaver, 12 of Cheney, 8 of Speer, 6 of De Soto and 34 native seedlings. These trees have all stood the ordeal of one winter and have made a vigorous growth.

Eighty-six plum seedlings of 43 varieties unnamed, were obtained from Mr. Thos. Frankland, Stonewall, Manitoba, in the fall of 1893. These were buried 2 feet deep until spring, and then planted on the hillside west of the arboretum. With the exception of two all are alive. As the native plums vary much in quality, by selecting the best, as they fruit, for future propagation it is believed that the quality may be gradually improved.

Three hundred seedlings of the native plum have been raised on the farm during the present season. These are now about 18 inches high and very vigorous.

The following plum seedlings were added to the list last spring: 5 seedlings of Voronesh (102); 5 of De Soto, from the Central Experimental Farm; and 2 Native Yellow Plums from Portage la Prairie. These are all living and healthy at this date.

TEST OF FALL AND SPRING SOWN PLUM PITS.

A quantity of native plum pits were received from Portage la Prairie in the fall of 1894. One-half of this consignment was packed in damp sand in boxes; the boxes being stored outside where they remained frozen in a solid mass all winter, and were sown the following spring, the other half was sown directly in the seed bed. Of the fall sown pits only 20 per cent have germinated to date, while 95 per cent of the spring sown seed came up in a few weeks, these latter have also made more robust plants.

CHERRIES.

The standard cherries which were new importations from the Central Experimental Farm, and mentioned on page 311 of last year's report, made a thrifty growth during last summer, but all succumbed to the severity of last winter. Many of these varieties have been tried before with the same result.

The present season there was sent from the Central Farm 5 each of seedlings of the six following varieties:—

Bessarabian,
Olivet,
Montmorency,

Red Morello,
Wragg,
Carnation.

These are in a thrifty condition at the present time, and it is hoped they may winter successfully.

The plantation of 200 eastern Sand cherries (*Prunus pumila*) mentioned in last year's report, although slightly injured by winter, are all growing well. Seedlings of this cherry have been received from several different points, which will be planted for comparative test with the native form. As the sand cherry varies very much in quality in different localities, it is hoped that some very good sorts will shortly be obtained.

CURRENTS.

The yield of black currants was very small this year, owing to the drought of the previous year. They entered the winter in a very bad shape, the leaves having all fallen off prematurely, and it was found in the spring that a large percentage of the fruit bearing wood had been killed. Some of the seedling varieties did not suffer so severely from these causes and gave a fair amount of fruit.

Of the old varieties, the Black Naples and Black Champion, withstood the dry season of 1894 and the protracted spring frosts of 1895 much better than Lee's Prolific.

The red and white varieties were not so much injured by drought and frost as the black varieties were, and a fine crop of fruit was gathered. Of the red sorts, Red Grape was the least injured, and has proven itself vigorous, healthy and a prolific bearer. Of the white currants the White Grape still leads the list.

SEEDLING BLACK CURRANTS.

All the seedling black currants, with the exception of one, fruited this season; weights and notes of fruit were carefully taken. Following are the results:

Name of Variety.	Flavour.	Colour.	Weight from 1 Bush.	Size.	Earliness.	Remarks.
Perth.....	Acid.....	Black....	22 oz.....	Medium....	Very early..	Vigorous.
Stewart.....	Good.....	do.....	22 oz.....	Large.....	do ..	do
Ontario.....	Woody.....	do.....	12 oz.....	Small.....	Early.....	Not thrifty.
Charmer.....	Poor.....	do.....	14 oz.....	do.....	Late.....	Generally poor.
Henry.....	Good.....	do.....	25 oz.....	Medium....	Early.....	Fairly healthy.
Star.....	Very good..	do.....	30 oz.....	Small....	Very early..	A fine bearer.
Lewis.....	Very acid...	do.....	17 oz.....	do.....	do ..	A shy bearer.
Climax.....	Excellent...	do.....	32 oz.....	Medium....	do ..	Very vigorous.
Lennox.....	Fair.....	do.....	19 oz.....	Large.....	do ..	Fairly healthy.
Middlesex.....	Poor.....	do.....	6 oz.....	Small.....	do ..	Unhealthy.
Parker, not fruited yet..	.....	.....	.....	.....	.....	Runs to wood.

NEW CURRANTS.

The list of currants below, were planted in 1893. They all bore fruit and are listed in order of merit.

RED CURRANTS.

Red Dutch, very productive, fine fruit. La Fertile, productive, ripens evenly. Knight's Early Red, productive, acid, fair flavour. La Conde, fairly productive. La Hative, not productive, poor fruit. New Red Dutch, not promising.

WHITE CURRANTS.

White Transparent, productive, fair fruit.

BLACK CURRANTS.

Baldwin, productive, very late. Prince of Wales, fairly productive. Ogden's Black, winter-killed, root and branch.

GOOSEBERRIES.

The Houghton, Smith's Improved, and the Native, had a fair quantity of fruit.

The Houghton has been attacked by a leaf-curling aphid. One row was sprayed with kerosene emulsion, but this seemed to have but little or no effect on the insects, probably owing to the emulsion having been used too late in the season. Unaffected plants have been propagated, and will be removed to a new plantation in the spring. The Smith's Improved and the Native were not badly affected with this insect.

Five bushes of Native Sandhill Gooseberry were received from D. D. Buchanan in 1894, and are making a vigorous growth, but have not yet fruited.

RASPBERRIES.

The cold weather of May injured the raspberry crop on this farm, as it did throughout the province, and very little fruit was obtained, but every variety has made a vigorous growth of well-ripened wood, and there is promise of a good crop next year.

Annexed will be found a list of the raspberries which have been planted in a new plantation on the hillside west of the arboretum. These have all been tested for four years, and found suitable for general cultivation.

RASPBERRIES TESTED FOR FOUR YEARS.

Name of Variety.	Colour.	Productiveness.	Hardiness.
Philadelphia	Red.....	Prolific.....	Very hardy.
Turner.....	do	Productive	Hardy.
Sarah.....	do	do	do
Marlboro.....	do	Fairly productive.....	do
Cuthbert.....	do	do	Half hardy.
Seedling 3-74.....	do	do	Hardy.
Caroline	Yellow.....	Productive	Tender.
Reeder.....	Red.....	do	do
Golden Queen.....	Golden	do	do
Seedling 3-7.....	Red.....	Not productive	Half hardy.
Hilborn	Black.....	Prolific.....	do

GRAPES.

Five native Manitoba grape vines were planted in 1893, and have made a fine growth.

Five vines each of Gibb and Bacchus grape vines, were received from the Central Experimental Farm this spring, these have become well established, and were covered with earth this fall. It is hoped they may survive the winter.

During the past year a considerable number of young fruit bushes have been grown on the farm from cuttings and layers, also about 60,000 young forest trees and shrubs from cuttings, layers and seeds. Many of these will be available for distribution next season for test in different parts of the province.

HEDGES.

Nine new hedges were planted this season in a group north-east of the arboretum, each 60 feet long and 10 feet apart.

Below will be found a list of the names of the trees and shrubs used for this purpose, they were all more or less adversely affected by being planted late.

The *Spiraea opulifolia* and *opulifolia aurea* were obtained from the Central Experimental Farm, but all the others are natives and the young plants were got from the wooded ravines and bluffs about the farm.

- Red osier cornel.—*Cornus stolonifera*.
- Wolf Willow or silver bush.—*Elæagnus argentea*.
- Snowberry.—*Symphoricarpus occidentalis*.
- Meadow Sweet.—*Spiræa salicifolia*.
- Native Rose.—*Rosa Sayi*.
- Saskatoon.—*Amelanchier alnifolia*.
- Hazelnut.—*Corylus Americana*.
- Pin Cherry.—*Prunus Pennsylvanica*.
- Aspen.—*Populus tremuloides*.
- Guelder rose-leaved spiræa.—*Spiræa opulifolia*.
- Golden-leaved spiræa.—*Spiræa opulifolia aurea*.

One hundred trees of the native White Spruce, *Picea alba*, were obtained from the woods south of Sewell, Man., and planted as a hedge for the protection of fruit trees on the hillside : these are all growing with the exception of two.

Many people are slow to transplant the native spruce from our woods and plains for the reason that in some cases a large percentage have died. But if the trees are obtained from the heavier soils and care taken to select the smaller sized trees and to keep the roots from drying during transplanting either by allowing the soil to adhere to them or by keeping the roots otherwise constantly moist, they may be moved with very little loss.

Two new hedges of box elder were planted this season ; one as a wind break for the propagating beds, the other to hide the manure heap. These were planted 2 feet apart in the rows ; 2-year-old trees were used for the purpose, and they have already become well established.

NEW TREE PLANTATION.

Last spring a plantation of one and a quarter acre in extent was planted at the west end of the farm near the main road. Two year old box elder and elm seedlings were used for this purpose.

The plot selected was summer-fallow, the soil a sandy loam. It has been found advantageous, to the young trees to plant on summer-fallow because this retains a good supply of moisture, and very little cultivation is necessary to keep the trees free from weeds the first year.

One object in planting this plot was to ascertain the cost of planting and maintaining an acre of trees in this province.

The method of planting was as follows : The plot was harrowed and rolled, a horse marker was then used marking the field both ways from north to south and from east to west, so subdividing the plot into squares, 4 x 4 and making it possible to cultivate both ways. Two men followed, one with a pail of trees the other with a spade. At each angle a hole was made using the spade as a dibler. The young seedlings were then inserted and thoroughly tramped. With a few exceptions these trees are all alive and have become well established.

NEW FOREST TREES AND SHRUBS.

The following new trees and shrubs were received from the Central Experimental Farm, and planted in nursery row. If found hardy, they will be transplanted to permanent quarters in the spring.

50 *Acer glabrum*.
30 *Cornus Sibirica*.
5 *Pinus Cembra*.
80 *Rhamnus Frangula*.

3 *Caragana pygmæa*.
20 *Cotoneaster vulgaris*.
3 *Cercidiphyllum Japonicum*.
10 Douglas Spruce, *Pseudotsuga Douglasi*.

SHRUBS.—Received 1894 and tested one year.

The shrubs mentioned in the list below were received in the spring of 1894 and have been exposed to the test of one winter.

Name of Variety.	When Received.	Number Received.	Number Alive at this Date.	Remarks.
Almond Pink.....	1894.....	1	0	Dead, probably drought.
do White.....	1894.....	2	0	do do
do Double Rose.....	1894.....	1	0	do do
Persian Yellow Rose.....	1894.....	2	2	Not healthy.
Berberis sinensis.....	1894.....	2	2	Healthy.
Russian euonymus.....	1894.....	4	4	do
Prunus Maackii.....	1894.....	4	4	do
Prunus Grayana Maxima.....	1894.....	2	2	do
Improved Elderberry.....	1894.....	5	5	Very healthy.
Hypericum Kalmianum.....	1894.....	2	2	Not healthy.
Betula Dahurica.....	1894.....	2	0	Did not start.
Pyrus spuria.....	1894.....	1	1	Fairly healthy.
Cotoneaster vulgaris.....	1894.....	3	3	Very healthy.
Caragana Redowsky.....	1894.....	12	12	do do
Caragana pygmæa.....	1894.....	12	0	Dead.
Philadelphus.....	1894.....	3	1	Healthy.
Rosa rubrifolia livida.....	1894.....	8	8	Small growth.
Lonicera chrysantha.....	1894.....	5	5	Small, healthy.
Viburnum rugosum.....	1894.....	2	2	Healthy.
Cornus mascula elegantissima.....	1894.....	2	0	Dead, did not start.
Viburnum pyræfolium.....	1894.....	1	1	Unhealthy.
Exochorda grandiflora.....	1894.....	1	0	Winter killed.
Weigelia lomerii.....	1894.....	1	0	do
do candida.....	1894.....	1	0	do
do Hendersonii.....	1894.....	1	0	do
Sumach.....	1894.....	2	2	Very thrifty.
Elæagnus macrocarpa.....	1894.....	4	0	Very dry when received.
do gracilis.....	1894.....	4	0	do do
do angustifolia—Wild Olive.....	1894.....	3	2	Healthy.
Russian Privet.....	1894.....	1	0	Winter killed.
Symphoricarpus racem. sus.....	1894.....	2	2	Healthy.
Berberis Thunbergii.....	1894.....	2	0	Did not start.
Pyrus Toringo.....	1894.....	2	0	Winter killed.
Rosemary leaved Willow.....	1894.....	2	0	Killed by frost.
Lonicera, 133 Vor.....	1894.....	2	1	Badiy killed back.
Cratægus sanguinea Schroederi.....	1894.....	10	3	Badly affected with drought.
Ligustrum Amurense.....	1894.....	25	25	Very healthy.
Rosa rugosa.....	1894.....	100	100	do
Basswood—Tilia Americana.....	1894.....	20	20	do
Acer Ginnala.....	1894.....	100	100	do

Two each of 25 varieties of lilac were received from Hoopes Bros., these are all dead with the exception of one shrub each, of Common Purple and Rouge de Marley. These appear to be all grafted on a species of privet, and their loss is probably due to the tenderness of the stocks.

SOME TESTS WITH TREE SEEDS.

Seeds of the native maple (box elder) and ash gathered in 1891, were sown in seed beds last fall to test their germinating qualities, 100 per cent of the box elder germinated and made fine plants, whilst not one of the ash seed spouted,

MAPLE SEED SOWN WET VS. DRY.

Part of the Manitoba maple seed (box elder) sown last spring was soaked in water for one week before sowing, two rows of the wet was tested against two rows of the dry ;

both lots were sown on summer-fallow, sandy loam soil, in drills 2 inches deep, the wet seed germinated quicker than the dry, the result is given below.

Name of Variety.	How treated	Number grown on two rows.	Present height.	Remarks.
Manitoba Maple or Box Elder, {	Wet.	2,600	15 inches. ..	Very vigorous.
<i>Negundo Aceroides</i> {	Dry	1,590	10 do ...	Fairly vigorous.

CUTTINGS.

Taking this season as a criterion the spring procured cuttings of poplars and currants give the best results, but with buttonwood, willows and artemisias, there is no perceptible difference between spring cuttings and fall cuttings. Very fair results were obtained from cuttings made and planted late in the fall. Of those cut and wintered in sand few struck and these made spindly plants, many of them being killed by the first dry weather.

It has been found here that cuttings should be cut with a sharp knife and not with pruning clippers as the latter bruises the ends of the slips causing them to rot.

Appended will be found the results of experiments with cuttings during the past season.

EXPERIMENTS WITH CUTTINGS.

Name of Variety.	When made.	When planted.	Percentage growing.	Remarks.
Dakota Cottonwood, <i>Populus monilifera</i> , large wood.....	Fall.....	Spring.....	80	Wintered in sand.
Dakota Cottonwood, 1-year old wood	do	do	70	do
do do	Spring.....	do	70	Cut and immediately planted.
Populus Bereolensis.....	Fall.....	do	25	Wintered in sand.
do 1-year old wood	Spring.....	do	95	Very robust.
do 3 do	do	do	75	Cut from trunk of trees.
do	Fall.....	Fall.....	45	Fair thrifty.
Artemisia abrotanum, South'n wood	Spring.....	Spring.....	100	Very healthy.
do do	Fall.....	do	100	Wintered in sand.
do do	do	Fall.....	100	Cut and immediately planted.
Artemisia abrotanum, var. Tobolskianum.....	do	Spring.....	100	Wintered in sand.
do do	Spring.....	do	100	Very healthy.
Salix acutifolia.....	Fall.....	do	100	Wintered in sand.
do	Spring.....	do	100	Healthy.
Salix Voronesh.....	Fall.....	do	100	Wintered in sand.
do	Spring.....	do	100	Thrifty.
Lonicera tatarica.....	do	do	25	Three-year old wood.
do	do	do	5	One season's growth wood.
Ribes aureum.....	do	do	50	Three-year old wood.
do	do	do	25	One-year old wood.
do	Fall.....	Fall.....	2	Weak growth.
Lee's Prolific Black currant.....	do	do	10	do
do do	Spring.....	Spring.....	90	Healthy growth.
do do	Fall.....	do	15	Wintered in sand.
Raby Castle Red currant	do	do	35	do
do do	Spring.....	do	90	Robust.
do do	Fall.....	Fall.....	15	Weak growth.

AVENUES.

This season the native maples (box elder) were attacked by the Box Elder Aphis (*Chaitophorus negundinis*). Having only a hand sprayer at the time, the trees being large, it was impossible to subdue them with any insecticide. Many of the trees were so badly infested that it is feared some will succumb. Many other trees in this vicinity have also been badly injured by this insect. With a larger spray pump, which will be available for use in the spring, we hope to be able to keep this pest in subjection.

FOREST TREES AND SHRUBS.

Last spring many additions were made to the arboretum around the superintendents' house; and, the season being favourable, most of them have done well. Some of these were transplanted from nursery rows, and some were obtained from the woods. The new native trees are:—

Basswood (<i>Tilia americana</i>).	Manitoba Mountain Ash (<i>Pyrus americana</i> .)
Native Larch (<i>Larix americana</i>).	Swamp Birch (<i>Betula pumila</i>).
Native Hawthorn (<i>Crataegus coccinea</i>).	Climbing Bitter Sweet (<i>Celastrus scandens</i>).
Native Alder (<i>Alnus incana</i>).	

For the instruction of visitors and convenience of identification, each tree in this plantation has been provided with a zinc label, the name being written with an indelible ink. This ink is made by dissolving common bluestone (sulphate of copper) 1 ounce in about half a pint of water, to which is added a little ink to give it colour; to prevent oxidation of the zinc the label is given a coat of shellac, after the name is written.

The trees and shrubs in this plantation now number 827, of 107 varieties.

Some planting was done on the gravel hill on the north-west corner of the arboretum, from which nearly all the surface soil was taken when grading; specimens of the following varieties were planted as a test of their suitability for a poor gravelly soil.

<i>Artemisia abrotanum</i> .	var. <i>Tobolskianum</i> .
do do	(Southernwood.)
<i>Populus Bereolensis</i> .	
<i>Spiræa opulifolia</i> .	
Manitoba maple (<i>Negundo aceroides</i> .)	
Dakota Cottonwood (<i>Populus monilifera</i> .)	
Native White Spruce. (<i>Picea alba</i> .)	

Most of these trees are growing fairly well. The artemisias have made good growth and are apparently suitable shrubs for this kind of soil.

FOREST TREE DISTRIBUTION.

The distribution of forest tree seedlings and cuttings has been continued, 291 parcels, each containing 100 cuttings, were sent out during the year, these were nearly all varieties of Russian poplars and willows which are hardy here.

Ninety collections of rooted trees were also sent to individuals and public institutions, who were willing to pay the express charges on them.

REPORTS FROM PARTIES SUPPLIED WITH TREES IN 1894.

Since my last report, the circulars sent out with the tree distribution in 1894, have been returned and their contents compiled.

From the accompanying summary it will be seen that the parties receiving trees have had air success for such an exceptionally dry year; the results of the distribution of 1895 will probably be still more satisfactory as the season has been a favourable one.

A number of farmers are already growing young trees for themselves and neighbours by means of cuttings, taken from the poplars and willows distributed in former years, and thus the usefulness of this good work is being extended.

ANALYSIS OF TREE REPORTS.

Number of reports received.....	143
No. reported as having received the parcels in good condition	89
do do do do fair condition.....	24
do do do do bad condition.....	17
do do as having had good success with the trees	95
do do do fair do do	20
do do do poor do do	28

DISTRIBUTION OF TREE SEEDS.

Two hundred and twenty-six, one pound packages of Manitoba maple tree seeds, were distributed during 1895, and from the few reports already received it is evident that the season has been a favourable one for the seedlings.

The following summary has been compiled from the reports received from the tree seed distribution of 1894. Although the summer of 1894 was unfavourable for the germination of tree seeds, it will be seen that the average number grown from a pound package of seed was 847; the particulars given show the advantage of thoroughly cultivating the land before sowing the seed.

TREE SEED DISTRIBUTION.

Number of reports received.....	72
do favourable reports.....	56
do unfavourable reports.....	13
do failures from dry weather.....	11
do do due to injury from cut worm.....	1
Average height of seedlings in the fall.....	12 inches.
Average number of seedlings from one pound of seed.....	847

BEST RESULTS OBTAINED BY THE MOST CAREFUL GROWERS.

Number of Seedlings from one pound of seed.	How land was prepared.	When sown.	Height in fall.
5000	New land fallowed.....	May 15.....	6 to 18 inches.
3000	Garden land.....	do 12.....	6 to 15 do
2745	Potato land.....	do 10.....	31 do
3000	Cattle corral.....	June 1.....	24 do
2200	Well cultivated.....	May 9.....	12 do

DISTRIBUTION OF SEED GRAIN AND POTATOES.

The following quantities were sent to applicants from this farm, in the spring.

Wheat in 2 bushels or more.....	32 lots
Barley " "	29 "
Oats " "	11 "
Grain of all kinds in three pound bags.....	149 "
Potatoes in two pound bags.....	48 "

THE VEGETABLE GARDEN.

On the whole, the past season has been favourable to the growth of vegetables. Although rains came late, this was compensated for by the copious showers which fell. Late spring frosts hurt some of the earlier sown vegetables, such as pease, radish, lettuce, etc., and the early fall frosts, combined with the rather cool summer, adversely affected those requiring heat, such as tomatoes, cucumbers, corn, etc. Onions did very well, as did also cabbage, cauliflower, beets, carrots, etc.

Following will be found the results of this year's varietal tests :

CARROTS.

Six varieties of carrots were sown outside in drills 18 inches apart, on 1st May, and all germinated. The roots were all remarkably clean and free from rot. *Pearce's Scarlet Model* was certainly the best variety, closely followed by *Danver's Half Long*. All varieties were lifted on 17th September.

Name of Variety.	Shape.	Diameter at Top.	Colour.	Flavour.	Average Weight.	Yield per Acre.
		In.			Oz.	Bush. Lbs.
Pearce's Scarlet Model . . .	Stump rooted.	2½	Scarlet	Excellent . . .	11	487 40
Danver's Half Long	do ..	2¼	do	Very good . .	8	440
Early English Horn	Long	2	do (Orange centre).	Fair	5	366 40
Henderson's Intermediate.	Half long	1¾	Scarlet	Good	5	322 40
Cooper Taber's Exquisite..	Long	1½	Yellow	Fair	5	219 5
St. Valery	do	2	Scarlet (Orange centre).	Good	4	205 20

CORN.

Seventeen varieties of corn were tested this season. All were sown on May 23, with "Planet Junior" hill-dropping drill, hills 3 feet apart. Thirteen of the varieties came to a condition fit for table use, and one variety, viz., Squaw Corn, ripened its seed. The exceptionally cool summer was rather detrimental to this vegetable, and the early frosts cut back some of the varieties that would otherwise have ripened their seed. Following are a few remarks on the most promising of the varieties :—

Squaw Corn.—An old variety here : can be depended on to ripen its seed, even in the most adverse seasons. A coloured flint corn, sweet and productive.

Mitchell's Extra Early (Home grown).—A white, flint corn of fair flavour and productiveness, early. An improvement by selection of Squaw Corn.

Burpee's First of All.—A 10-rowed dent variety of good flavour, fairly early and very productive : a desirable sort for this province.

Early Cory.—An 8-rowed dent corn ; of good flavour and fairly early.

CORN, Test of Varieties.

Name of Variety.	Ready for use.	Variety.	Length of Cob.	Weight per Dozen.	Flavour.
			Inches.	Lbs.	
Squaw Corn	Aug. 15..	8-rowed flint.....	5½	2	Good.
Mitchell's Extra Early (own seed).....	do 23..	do	7	3	Fair.
Cory (own seed).....	do 30..	8-rowed dent.....	8½	3¼	Good.
Burpee's First of All (own seed).....	do 23..	10-rowed dent.....	6½	3¼	do
Extra Early Vermont (own seed)	do 30..	do	6½	3¼	do
Extra Early Marblehead	Sept. 5..	do	8	4½	do
Ford's Early Sugar.....	do 5..	8-rowed dent.....	6½	3	do
Mitchell's Extra Early (new seed).....	Aug. 26..	8-rowed flint.....	6¼	2½	Fair.
Nameless Variety No. 1.....	do 28..	do	7	2½	do
do No. 2.....	do 30..	do	7	2¾	do
Brandon Hybrid No. 1.....	do 30..	8-rowed mixed.....	9	3¼	do
do No. 2.....	do 30..	do	7	3¼	do
do No. 3.....	Sept. 2..	do	8	3	do

NOTE.—The first five and the last three on this list were grown from seed ripened on the Experimental Farm, Brandon.

PEASE.

Sixteen varieties of pease were sown—nearly all suffered severely from spring frosts, and on 10th May they were cut so badly that it was thought necessary to make another sowing, but after a time they recovered, and the second sowing was hoed out. The only variety not injured by frost was Telegraph.

Sunol (Home grown seed).—An early, round pea, of fair flavour and productiveness, has again proven itself the earliest variety tested.

American Wonder (Home seed).—One of the earliest of the wrinkled pease, only a few days behind Sunol and of much better flavour. Height, 6 inches.

Juno (Home seed).—A second early pea, of good flavour. Pods large and well filled.

Prince of Wales (Home seed).—A late pea, of good flavour, and very productive. A first class variety.

Burpee's Profusion (Home seed).—A late wrinkled pea, of good flavour and very productive. A good variety.

Yellow, for split purposes (Home seed).—Although this was sown rather late, enough seed has ripened to sow a larger plot in 1896.

Telegraph.—A late pea, of good flavour and very productive. Combined with its hardness, this makes it one of the best varieties tested.

Shropshire Hero.—A late pea, of good flavour and very prolific.

All sown in drills 4 feet apart.

PEASE, Test of Varieties.

Name of Variety.	Date Sown.		Date ready for use.		Average length of Pod.	Number of Peas.	Flavour.
					Inches.		
Sunol (own seed).....	April	5..	July	2..	2	7	Fair.
American Wonder (own seed).....	"	5..	"	4..	2	6	Good.
Juno (own seed).....	"	15..	"	10..	2½	7	"
Prince of Wales (own seed).....	"	15..	"	15..	3	7	Very good.
Burpee's Profusion (own seed).....	"	15..	"	12..	3	6	Good.
Yellow for split purposes (own seed)...	May.	16..			2½	6	
Early variety (no name).....	Apr	5..	July	8..	2½	7	Very poor.
Little Giant.....	"	15..	"	6..	2	6	Good.
Hair's Dwarf Mammoth.....	"	15..	"	31..	2½	5	Fair.
New Heroine.....	"	15..	"	30..	3	8	Good.
Stratagem.....	"	15..	"	27..	2½	6	"
Telegraph.....	"	15..	"	15..	3	8	Excellent.
Juno (new seed).....	"	15..	"	15..	2½	7	Good.
Maud S.....	"	22..	"	5..	2	6	Fair.
Sunol (new seed).....	"	22..	"	4..	2	6	"
Shropshire Hero.....	"	22..	"	30..	3½	8	Very good.
C.P.R. Pea.....							Only about 5 p.c. of this variety germinated.

CABBAGE.

Twelve varieties of cabbage were sown, but only 10 germinated, the varieties known as *Dwarf York* and *Manchester Red Drumhead* not coming up. All were sown in hotbed on 20th April and planted in the open on May 27. Most of the varieties did very well, and though no very large heads were produced, all were of an average size and well formed. Of the early varieties, *Early Jersey Wakefield* was the best, and *Vandergaw* the best of the late varieties.

Early Jersey Wakefield.—An early, well flavoured cabbage of fine texture. Heads pointed and solid ; a very desirable early variety.

Henderson's Early Summer.—A flattish, late cabbage of fair flavour and substance.

Early Winningstadt.—An intermediate cabbage of good texture and flavour. Heads pointed and solid.

Vandergaw.—The best late cabbage tested of the Drumhead type, firm and solid. A first rate variety.

Dark Red Erfurt.—A red cabbage of good flavour and texture. Although the heads were not large yet they were very firm and solid.

Filderkraut.—A long taper-pointed cabbage of good flavour and substance, a desirable variety.

Name of Variety.	Date First Ready.	Percentage Headed out.	Average Weight.	Shape.	Flavour.
			Lbs.		
Early Jersey Wakefield..	July 25....	100	5	Pointed	Good
Henderson's Early Summer ..	Aug. 10....	95	6	Round.....	do
Early Winningstadt.....	do 20....	100	7	Pointed	do
Henderson's succession.....	Sept. 5....	98	10	Flat.....	do
Drumhead Savoy.....	do 13....	50	4½	Round.....	Fair.
Vandergaw.....	do 23....	90	9	Flat.....	Good.
Dark Red Erfurt.....	do 23....	90	4½	Round.....	do
Filderkraut.....	do 23....	100	6	Pointed	do
Express.....	July 30....	50	4	Round.....	Fair.
Etampes.....	do 20....	90	4	Pointed	do

CAULIFLOWER.

Seven varieties of cauliflower were sown in hot-bed on April 20th, and all germinated. They were planted in the open on June 3rd, most of the heads produced were of good size, although some of them were of poor colour and texture.

Henderson's Early Snowball.—This was the best variety tested. Heads of good size and colour, very close grained, and of good flavour.

Dwarf XXX Erfurt.—A good variety. Heads dense and very white, flavour good.

Early French Demi-Dur.—Has a good close grained head, very white in colour. A desirable variety.

Selected Early Erfurt.—Only a fair variety. Heads dense, but rather poor in colour.

Name of Variety.	Date First Headed.	Percentage Headed Out.	Average Weight.	Colour.	Flavour
			Lbs.		
Snowstorm.....	July 15.....	80	2 $\frac{1}{4}$	Poor ...	Poor ...
Early Snowball.....	do 10.....	90	2 $\frac{3}{4}$	do ...	Fair ...
Dwarf XXX Erfurt.....	do 13.....	100	2 $\frac{2}{8}$	Good..	Good....
Selected Early Erfurt.....	do 13.....	100	2 $\frac{1}{4}$	Poor ...	Fair.....
Walcheren.....	do 30.....	50	2 $\frac{3}{4}$	do ...	do
Early French Demi-Dur.....	do 16.....	90	2 $\frac{1}{4}$	Good... Good....	
Henderson's Early Snowball.....	do 20.....	100	2 $\frac{3}{4}$	do ...	do

ONIONS.

Nine varieties of onions were sown in drills twelve inches apart. All germinated with one exception, viz., *Giant Spanish Yellow*. This year gives additional evidence that onions are one of the most paying vegetables grown. All varieties averaged over 400 bushels per acre, and as they usually command a good price, few vegetables will give the same return. Many growers leave onions too long in the ground, and the frost injures them before they are dried. It is best to pull them a little on the green side rather than leave them to ripen in the ground. The best keeping onion of the varieties tested last year, was *Large Red Globe*, which when looked over on April 12th, 1895, were as sound as when stored. This year taking all points into consideration, *Yellow Globe Danvers* and *Red Globe Danvers* were the two best varieties.

Silverskin.—A medium sized white onion of mild flavour, irregular in shape, and having a loose moist skin, which will probably detract from its keeping qualities.

Red Wethersfield.—A Red Globe onion, much later in arriving at maturity than the others, and inclined to be thick-necked.

Yellow Globe Danvers.—Although not a very heavy yielder, its thin neck, and early ripening qualities, make it a variety that can always be relied on here, globe shaped, light yellow in colour.

Yellow Flat Danvers.—A flat onion, similar in colour to Globe Danvers, but later and more thick-necked than that variety.

Red Danvers.—A red globe onion of fine colour and appearance, ripens early, and has a thin neck. One of the best varieties tested.

Southport Red Globe.—A red globe onion of good size, but has a tendency to thick-neck.

Southport Yellow Globe.—A yellow globe onion of good form and substance, a heavy yielder, and produces few thick-necked onions.

Mammoth Silver King.—A flat white onion of good flavour, but having the loose skin and irregularity of Silverskin, not desirable.

Shallots.—A potato onion, very useful on account of its early ripening.

Garlic.—This seems to do well here. From 1 lb. of sets, was produced 6 lbs., also 1 quart of top sets.

ONIONS, Test of Varieties.

Name of Variety.	Date Sown.	Date Pulled.	Date Ripened.	Colour.	Yield per Acre.	
					Bush.	Lbs.
Large Red Wethersfield.....	April 10..	Sept. 16..	Sept. 30..	Red	605	
Southport Yellow Globe.....	do 11..	Aug. 28..	do 16..	Yellow...	479	53
Southport Red Globe	do 22..	do 28..	do 16..	Red	469	33
Red Globe Danvers.....	do 11..	do 28..	do 16..	Bright red	448	15
Yellow Flat Danvers	do 11..	do 28..	do 16..	Yellow...	435	52
Yellow Globe Danvers	do 10..	do 23..	do 9..	do ..	357	17
Mammoth Silver King	do 10..	do 28..	do 16..	White....	345	49
Small Silverskin	do 11..	do 20..	do 16..	do	329	
Shallots	do 12..	July 30..	Aug. 20..	.....	45 lbs. from 3 lbs.	
Garlic Sets	do 12..	Sept. 17..	Sept. 30..	.....	6 lbs. from 1 lb. and	
Giant Spanish Yellow.....	This varie	ty did not	germinate.		1 quart tops.	

CELERY.

Twelve varieties of celery were sown in boxes, in hotbed, on 3rd April. All varieties germinated well, and were transplanted into boxes on 3rd May, and planted outside on June 21. The old plan of planting, by digging a trench, was not adopted, as too much of the rich soil is removed by this operation. Only enough soil was taken out to admit of holding water, and having had a larger water supply than last year, this vegetable grew stronger and better in every way. All were lifted on 3rd October.

White Plume.—A white self-blanching celery of excellent flavour, and very early.

Giant Golden Heart.—Of a pale yellow colour when ready for use. Excellent flavour, and very vigorous.

New Rose.—A light Pink variety of good flavour and appearance, and a strong grower.

Paris Golden Yellow.—A yellow self-blanching variety, of a habit resembling *White Plume*, a desirable sort.

Turkish Giant Purple.—A vigorous growing variety of a deep pink colour, flavour good, evidently a fine late sort.

Name of Variety.	Length of Head.	Weight per Dozen.	Colour.	Flavour.
	Inches.	Lbs.		
Giant Golden Heart.....	23	17	Light yellow	Good
New Rose.....	16	18	Light pink..	Good
New Giant Pascal.....	15	16	White.....	Fair
New Red Pascal.....	14	14	Light pink..	Good
White Plume.....	13	14	White.....	Very good
Sheppard's Dwarf Rose.....	16	14	Light pink..	Good
Large Ribbed White.....	15	14	White.....	Fair
Turkish Giant Purple.....	18	16	Deep pink..	Good
Dwarf White.....	14	15	White	Fair
White Solid.....	16	17	White.....	Good
Carter's Dwarf Crimson.....	14	15	Deep pink..	Good
Paris Golden Yellow.....	13	14	Light yellow	Very good

BEETS.

Seven varieties of beets were tested all sown in drills 18 inches apart on 1st May. Some of the varieties were inclined to small branching roots, but on the whole the crop was a success. The best variety tested was *Improved Early Blood Turnip* followed by *Whyte's Very long Deep Blood*. All were lifted on 17th September.

Improved Early Blood Turnip.—A turnip shaped beet of a splendid dark colour, and even size, matures early.

Whyte's Very long deep Blood Red.—A long beet of good colour and flavour, one of the best varieties tested.

Rennie's Intermediate.—A long beet of good colour, containing a little white, a good variety.

Lentz.—A turnip beet of fair colour, contains a small quantity of white.

Name of Variety.	Shape.	Colour.	Average Weight.	Yield per Acre.
Bassano Flat Red....	Flat	Poor; nearly all white ..	1 $\frac{2}{3}$ lbs.....	1,144 bush.
Whyte's Very Long Deep Red.....	Long	Good; no white.....	2 lbs.....	1,173 $\frac{2}{3}$ do
Rennie's Intermediate	do	do	1 $\frac{1}{2}$ lbs.....	806 $\frac{1}{2}$ do
Evan's Medium	do	Fair; some white..	1 $\frac{1}{3}$ lbs.....	792 do
Lentz.....	Turnip.....	do	1 lb	616 do
Improved Early Blood Turnip.....	do	Very good.....	12 ounces...	528 do
No Plus Ultra.....	Long	Fair; some white.....	14 do ...	498 $\frac{1}{2}$ do

LETTUCE.

Nine varieties of lettuce were sown, and all germinated with one exception, viz., *Big Boston*. All were sown on 1st May in drills 18 inches apart. This vegetable did remarkably well this year, all varieties retaining their crispness longer than usual, although nipped slightly with spring frosts, this did not seem to injure them, and they all made good hearts of excellent texture.

California All Heart.—Cabbage lettuce, well curled, and of splendid flavour, large heart, cool, crisp and juicy, the best variety tested.

Early Curled Silesia.—Cabbage lettuce, fairly well curled, and of fair flavour.

Early Ohio.—A well curled cabbage lettuce, fair sized, heart of good flavour.

Simmer's Nonpariel.—Cabbage lettuce of good flavour and appearance.

New Blonde Beauty.—A well curled cabbage lettuce of splendid flavour, cool, crisp, juicy and sweet, one of the best sorts tested.

Name of Variety.	Date Tested.	Date went to Seed.	Average Weight.	Flavour.
			lbs.	
Early Curled Silesia.....	June 30..	Aug. 1..	1	Fair.
Early Ohio.....	do 30..	July 31..	1	Good.
Simmer's Nonpariel.....	do 30..	do 31..	1	Excellent.
California All-Heart.....	do 30..	Aug. 2..	1 $\frac{3}{4}$	do
Imperial Cabbage.....	do 30..	July 31..	1	Poor.
Early Hanson.....	do 30..	Aug. 3..	1 $\frac{2}{3}$	Fair.
New Blonde Beauty.....	do 30..	July 31..	1 $\frac{1}{2}$	Excellent.
Defiance	do 30..	do 31..	1 $\frac{1}{4}$	Fair.
Big Boston.....	This variety did not germinate.			

FALL SOWING OF LETTUCE.

The variety selected for this test was *California All Heart*. Home grown seed. While the fall sown plants gave the largest seed grain weight, there was no other appreciable difference, and it would appear that it is immaterial whether lettuce is sown in the fall or spring.

BEANS.

Eight varieties of beans were sown in drills 2 feet apart on 23rd May, with one exception, Broad bean.

Early Mazagan.—Sown on June 1st. Two varieties did not germinate viz., *Dwarf Triumph* and *Royal Dwarf Kidney*. None of the varieties ripened seed.

Emperor William.—This was the earliest of the varieties tested. A green bean of good flavour and substance, very productive.

Thorburn's Early Refugee Wax.—A light yellow bean of good flavour. Early and very productive, one of the best varieties tested.

Speckled Wax.—A deep yellow bean of good flavour and fairly productive ; a desirable variety.

Mammoth Red German Wax.—Colour deep yellow, of good flavour and fairly prolific.

Broad Bean Early Mazagan.—Broad bean of splendid flavour and very productive. A number of the pods, however, did not fill.

Name of Variety.	Date Ready.	Colour.	Length of Pod.	No. of Beans.	Productive-ness.	Flavour.
			In.			
Emperor William (own seed)....	July 30.	Green.....	7	5	Prolific.	Good.
Thorburn's Early Refugee Wax .	Aug. 3.	Light Yellow.	4½	5	Very prolific	do
Emperor William (own seed)....	do 2.	Green.....	7	5	Prolific.....	do
Speckled Wax.....	do 10.....	Deep Yellow..	7½	5	Very prolific	do
Mammoth Red German Wax....	do 8.. ...	do ..	7	5	Prolific.	do
Broad Bean Early Mazagan.....	do 13.....	.....	7½	4	Fr'ly prolific	do

RADISHES.

Ten varieties of radishes were tested all sown in the open, in drills, 12 inches apart. The first sowing was made in April, and was completely frozen on 10th May. A second sowing was made on 4th June, with results as given below. None of the varieties ripened their seed.

Rosy Gem.—A round radish of good flavour and appearance.

New Rosy Gem.—This variety has again proven itself one of the best grown here. Round, crimson, tipped with white, of excellent flavour.

Brightest Long Scarlet.—An intermediate variety of excellent flavour. Colour, brilliant scarlet with white tip. Valuable for market purposes on account of its fine appearance.

Ne Plus Ultra.—A round radish of a deep scarlet colour, flavour good, a desirable variety.

Name of Variety.	Date Ready.	Date Went to Seed.	Colour.	Shape.	Flavour.
French Breakfast.....	June 29	July 15	Pink and white	Half long.	Good.
Rosy Gem.....	do 28	do 15	Scarlet	Round ...	do
Round Rose.....	do 28	do 18	Deep red	do ...	do
Half Long Scarlet.....	do 29	do 15	Red	Half long.	Fair.
New Rosy Gem.....	do 28	do 20	Bright crimson, white base.	Round ...	Very good
Brightest Scarlet.....	do 29	do 20	Deep scarlet, white base...	Long.....	Good.
Scarlet Button.....	do 29	do 15	do	Round ...	Fair.
Ne Plus Ultra	do 29	do 15	do	do ...	Good.
Golden Turnip.....	July 5	do 12	Yellow	Half long.	Very poor.
China Rose.....	do 5	do 14	Rose	Long.....	do

TOMATOES.

Owing to the cool summer and early fall frosts, tomatoes were not a success this season, only 5 out of 13 varieties tested having ripe fruit.

Name of Variety.	Date first ripened.	Weight of ripe fruit.	Weight of green fruit	No. of plants	Shape.	Flavour.
Earliest of All (own seed).....	Aug. 26..	7 ounces..	15 lbs.....	6	Wrinkled...	Fair.
Early Ruby (own seed).....	Sept. 5..	10 " ..	20 "	6	"	Good.
Dwarf Champion (own seed) ...	None....	None.....	1 lb	1	Smooth	
Everbearing (own seed).....	"	"	9 lbs.....	8	"	
Dwarf Aristocrat (own seed).....	"	"	1 lb	1	"	
Early Ruby (new seed).....	"	"	72 lbs.....	23	Wrinkled..	
Perfection.....	"	"	8 "	28	Smooth	
Canada Victor.....	"	"	19 "	27	"	
Early Mayflower.....	"	"	12 "	24	Wrinkled..	
Mitchell's No. 1	"	"	13 "	23	Smooth	
Acme.....	Sept. 6..	4 ounces..	6 "	23	"	
Ponderosa.....	None....	None.....	6 oz.....	31	Wrinkled..	
Earliest of all (new seed).....	Aug. 19..	3 $\frac{1}{8}$ lbs..	49 lbs.....	28	"	
Strawberry, or Husk.....	None....	None.....	Frozen .....		.....
Early Ruby.....	Aug. 26..	28 $\frac{8}{18}$ lbs..	23 lbs.....	40	Wrinkled..	

CUCUMBERS.

The cool season affected the cucumbers adversely. Ten varieties were tested, and of these only two (both forcing sorts) gave any returns. These were started in hotbeds with good bottom-heat. Those started in spent hotbeds, and outside, did not mature cucumbers. The forcing variety *Telegraph*, was very productive, its long and smooth straight fruit, being produced in great profusion. Flavour excellent.

Noa's Forcing.—Rather crooked. Smooth neck, the lower half spiny. Of good flavour and fairly productive.

PEPPER.

One variety was tested, viz., Long Red Cayenne. This was sown in boxes in hotbed on 15th April, and transplanted into boxes on 27th April. Planted in a spent hotbed on June 3, with the sash removed, it produced fruit in great profusion. Fruit about 7 inches long of a brilliant scarlet colour, and good flavour.

ASPARAGUS.

Three varieties of this vegetable are under cultivation here, viz., Conovers Colossal, Barr's Mammoth and Giant Argenteuil the best as yet is Conovers Colossal. The plants were put out when two years old from seed, in rows 1 foot apart. Asparagus is a hardy perennial vegetable which does very well here. This season it was nipped several times with spring frosts.

HERBS.

The following varieties of savory herbs, were sown outside on 1st May, in drills 18 inches apart. *Broad-leaved Sage, Sweet Basil, Mint, Sweet Marjoram, Summer Savory, Thyme, Dandelion and Parsley*. All germinated with the exception of Dandelion and Mint, grew very well, and were dried in due course and thus preserved for future use.

EGG PLANT.

One variety was tested, and produced some ripe fruit. Shape, long-oval ; colour, deep purple. Sown in hotbeds on 1st April, transplanted into boxes on 27th April, and planted out on 11th June.

TOBACCO.

Seed of this was received from Ottawa, and sown in hotbeds on 15th April, transplanted into boxes on 27th April, and planted outside on 11th June. The plants were very strong when planted out, and produced large leaves, which however were cut badly during a hail storm.

SPINACH.

One variety (*Improved Victoria*) was tested. Sown outside in drills 18 inches apart on 10th April, and ready for use on 10th May. Very tender and of excellent flavour. This is a useful vegetable as it comes in when few others are to be had.

THE FLOWER GARDEN.

The flower garden this year was a decided success, and all varieties made a good show. In annuals we would call particular attention to a few varieties not generally grown, which have done so well here that we think they are worthy of general cultivation.

Salpiglossis variabilis.
Gaillardia Lorenziana.
Scabiosa major
Antirrhinum dwarf

The above are easy of cultivation and give splendid results. Among perennials the following have been found specially useful and desirable. They are all hardy and free bloomers :—

Name of variety.	Period of flowering.
<i>Delphinium grandiflorum</i>	26th June to 20th August.
<i>Aguilegias</i> , mixed colours.....	1st June to 12th July.
<i>Pæonies</i>	28th June to 10th July.
<i>Hemerocallis flava</i> —Day lily.....	16th July to 30th August.
<i>Perennial Phlox</i>	5th August to 1st September.
<i>Coreopsis lanceolata</i>	1st July to 5th September.
<i>Lychnis chalcedonica</i>	20th June to frost.
<i>Achillea the Pearl</i>	3rd July to 6th September.
<i>Papaver nudicaule</i> —Iceland Poppy.....	27th May to 29th August.
<i>Platycodon grandiflorum</i>	10th August to 30th August.
“ “ album	10th August to 30th August.
<i>Lilium tigrinum</i> —Tiger lily.....	24th August to frost.
“ <i>umbellatum</i>	8th July to 3rd August.

Hibiscus crimson eye has been tried, but the season here is not long enough to bring it into blossom.

GLADIOLI.

One hundred *Gladiolus* bulbs were received this year from the Central Experimental Farm. They were potted on arrival into small pots, and put into hotbed, and after having made a good growth were planted outside. They all flowered well, and some very large spikes were obtained. It is necessary to lift these bulbs in the fall, and store them in a cool (though frost proof) cellar, planting out again early in the spring.

ROSES.

This year we have had some success with roses. As will be seen on page 329 of last year's report, 13 varieties were alive in the fall of 1894, one of which, *Madame Bruant*, had stood the severity of the previous winter. This plant, together with another of the same variety received last summer, came through the winter of 1894 without injury, and flowered fairly well this summer. Another variety, *Gem of the Prairies*, a climbing rose, planted in the summer of 1894, survived the winter all right and made good growth, but did not flower.

BULBS PLANTED FALL, 1894.

The following bulbs were planted in the fall of 1894 :—

Tulips, single and double mixed.
 Hyacinths, single and double mixed.
 Iris, English.
 do Spanish.
 Scilla, *Sibirica*.
 Narcissus, mixed.
Lilium, *candidum*.
 do *auratum*.
 do do *Wittei*.
 do *concolor*.
 do *cordifolium*.
 do *Batemani*.

Of the above the tulips and scillas and Spanish Iris came up and flowered fairly well. The remainder did not start, and later in the season the lily bulbs were examined and were found to have all decayed.

CANNAS.

Nine varieties of cannas were received from the Central Farm this year, and were planted outside. All made a vigorous growth, and 5 of them flowered. They are well worth growing if only on account of their beautiful foliage. All were packed in sand in the cellar this fall.

Name of Variety.	Date Planted.	Flowering Period.	Height.	Remarks.
Canna Robusta Perfecta.....	May 7, 1895.	August 6th to frost.....	3 feet.....	} Fine for centres of beds; splendid foliage, and flowers of vivid coloring.
do O. de grand Rouge.....	do ..	Did not flower.....	18 inches.....	
do Brimmingsii.....	do ..	do ..	2 feet	
do Antoine Crozy.....	do ..	July 30th to frost.....	1 foot.....	
do Admiral Courbet.....	do ..	Did not flower.....	18 inches.....	
do Princess of Nice.....	do ..	August 3rd to frost.....	2 ft. 6 inches..	
do Jules Chrétien.....	do ..	July 25th to frost.....	18 inches.....	
do Brilliantissima.....	do ..	July 22nd to frost. . .	2 feet.....	
do Adolphe Weicke	do ..	August 10th to frost...	18 inches.....	

DAHLIAS.

Fourteen varieties of the above were received this year from the central farm and planted outside. Most of them flowered before frost and some of them produced some splendid blooms. The most conspicuous and one of the most successful sorts was Mrs. Langtry. Next year it is proposed to start them in hot-beds and get a good growth on them before planting out; this will bring them into flower much earlier. They were lifted in the fall and stored dry in the cellar.

HOPS.

In the spring of 1894, 50 hop sets of the Kentish Golden variety were received from British Columbia and were planted in hills, eight feet apart. Twenty of these were winter killed; the remainder were poled this spring. They made a growth of about 12 feet and produced an average of one pound of small hops per hill.

Last spring several hills of native Manitoba hops were planted, for the purpose of comparing with the imported ones.

TILE DRAINING.

I take pleasure in reporting that the tile drains laid during 1893 and 1894 have worked very satisfactorily. Fields that were formerly covered in spring with water were this year quite dry and produced large crops of grain.

Many farmers have expressed their opinion that the severe frost in winter would destroy any tile placed less than eight feet below the surface. When they are properly laid, and have a reasonable fall, no water lodges in them; and hence there is no reason to expect any injury from this source.

FARMERS' INSTITUTE MEETINGS.

Since my last report, institute meetings were attended by invitation at the following places, and addresses given at each of them, the meetings were in nearly every instance well attended and more than usual interest shown in the Experimental Farm work:

January 19, Portage la Prairie, 26, Blythe, 29, Neepawa, 31, Gladstone; February 15, Elkhorn; March 2, Little Stony Mountain, 12, Hamiota, 13, Oak River, 14, Rapid City, 28, Glenboro, 29, Belmont, 30, Brandon; June 13, Wawanesa, 20, Bradwardine, 21, Arrow River, 22, Birtle, 24, Russell, 26, Strathclair, 27, Hamiota, 28, Oak River, 29, Rapid City. Twenty meetings in all.

VISITS TO THE FARM AT STONY MOUNTAIN PENITENTIARY.

Under your instructions and at the request of the Minister of Justice, I made two visits during the year to the farm at Stony Mountain Penitentiary, for the purpose of conferring with the warden regarding the most improved methods of carrying on the farm work there, and of rendering any assistance in my power. My second visit made in company with yourself was just after harvest, and it was gratifying to see the fine crops which had been gathered there.

ACKNOWLEDGMENTS.

I beg to acknowledge with thanks the following donations to this farm during the year:—

Bright Nesbit, seed wheat.
 S. C. Young, Fort William, Ont., Mountain Ash Trees.
 D. D. England, Winnipeg do do
 A. A. Brooke, Barnsley, Man., vegetable seeds.
 Wm. Summerton, Oxbow, N.W.T. do
 Prof. Green, St. Anthony's Park, Minn., U.S., Willow Cuttings.
 Calgary *Herald*, Sugar Beet Seed.
 R. Waugh, Winnipeg, Grass Seed.
 John Parkinson, Portage la Prairie, Plums.
 A. Stevenson, Nelson, Man., Tree Seeds.

METEOROLOGICAL.

Below will be found the maximum and minimum thermometer readings for the past year, also the amount of rainfall and sunshine for the growing season :

TEMPERATURE.

Months.	Maximum.			Minimum.		
1894.						
November	49°	above zero on	6th.....	25°	below zero on	28th.
December	37°	do	14th.....	32°	do	27th.
1895.						
January	28°	do	14th.....	37°	do	8th.
February	35°	do	28th.....	46°	do	4th.
March	56°	do	26th.....	35°	do	13th.
April	88°	do	11th.....	18°	above zero on	26th.
May	79°	do	3rd.....	21°	do	11th.
June.....	84°	do	15th.....	29°	do	10th.
July.....	92°	do	2nd.....	35°	do	17th.
August	88°	do	15th.....	27°	do	31st.
September.....	95°	do	2nd.....	19°	do	23rd.
October.....	74°	do	12th.....	4°	do	31st.

RAINFALL.

	Inches.
April	·1
May	2·9
June	1·5
July	4·2
August	1·3
September	1·5
Total	<u>11·5</u>

SUNSHINE.

	Hours.
March	215·1
April	201·5
May	207·9
June	191·5
July	230·3
August	268·6
September	159·6
Total	<u>1,474·5</u>

CORRESPONDENCE.

Since my last report, 2,162 letters have been received and 1,918 letters despatched from this office ; this is irrespective of about 680 circulars sent out.

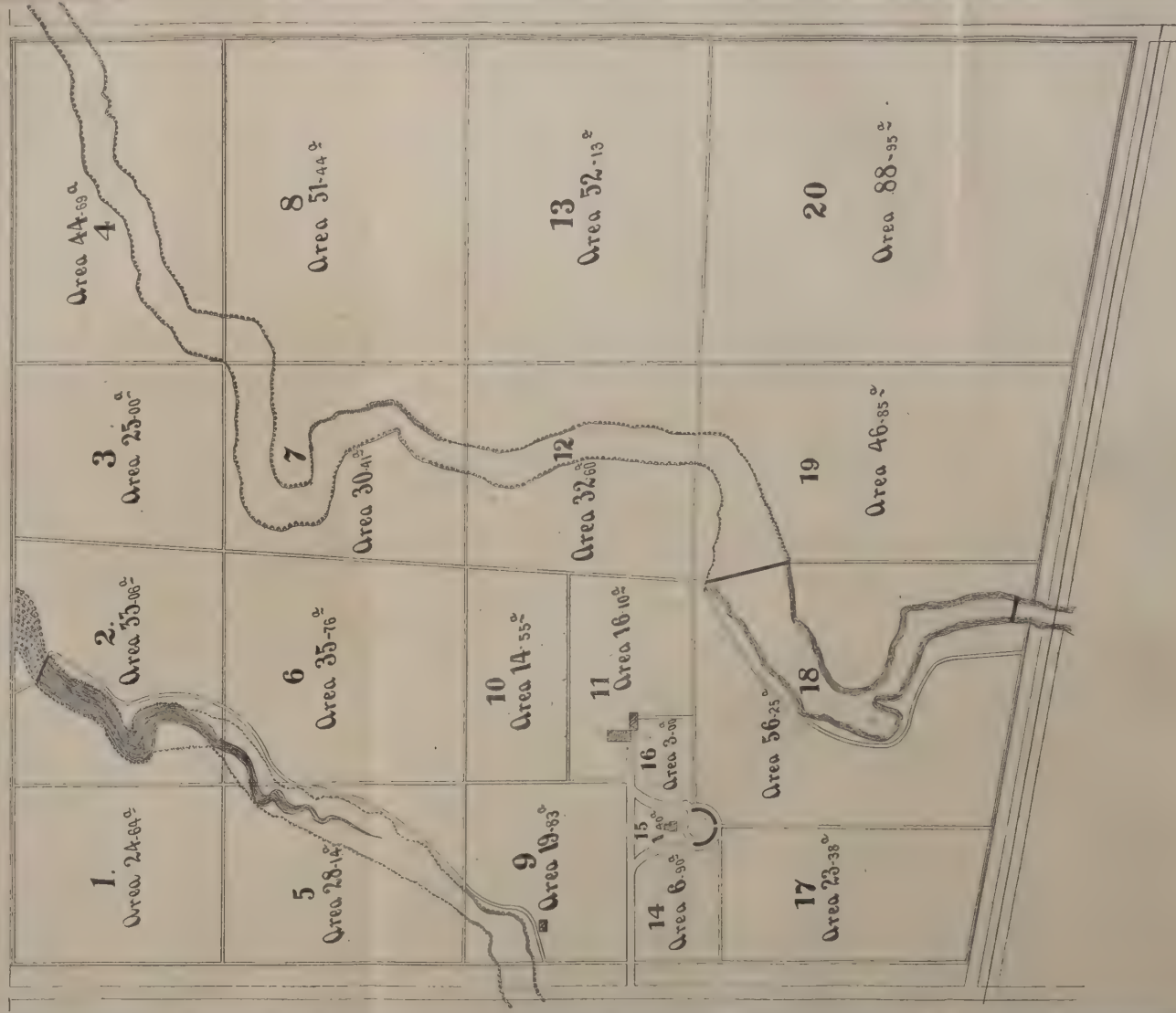
I have the honour to remain, sir,

Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM

INDIAN HEAD



EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF A. MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

30th November, 1895.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith, to you, the eighth annual report of operations on the Experimental Farm for the North-west Territories, at Indian Head, Assa., during the year 1895.

Like all preceding years, the season just past has been an exceptional one. Spring opened out in the latter part of March with very warm weather, so much so that seeding was general in the first week in April, and by 1st May trees were all out in leaf—three weeks earlier than usual. Winds were almost continuous during the month of May. On the 10th a cold wave passed over the country; the temperature on the Experimental Farm falling to 21° F. or 11° F. of frost, and on the following day to 18° F. or 14° F. of frost, with the result that fruits of all kinds were almost totally destroyed, and oats, barley, pease and garden stuff cut back, in many cases to the ground.

The weather continued dry, windy and cold to the end of the month, and on the 20th May, another frost of 13° F. cut the grain back for the second time. However, a very heavy general rain fell on the 31st, which made a wonderful change in everything in a very short time. Up to this time many fields of grain had not started to grow, many others were partially up but very thin, and very few were looking at all promising for a good crop.

Throughout June the rains were frequent and heavy, and they continued to the middle of July. The growth of the crops was wonderful over almost the whole of the North-west Territories, but danger was to be anticipated from so much rain. Several times in July the thermometer fell to near the frost line, and with such a rank growth of grain, a very few degrees would have been fatal. Cold waves passed over the country each week from July 18 to the latter end of August. In some places, tender vines, corn etc., were nipped, but grain escaped till August 20, when several degrees of frost visited some districts, while others escaped. The first frost on the Experimental Farm occurred on August 30. Previous to this date cold waves had passed over the Farm, nipping corn, etc., but not injuring the grain.

The crop throughout the Territories the past season, has been a very large one, but the sample does not equal that of last year on account of rank growth and damage sustained by frost.

Smut in wheat has not been bad throughout the country, although all districts had a little. In oats and barley, however it was very prevalent, and has caused considerable loss in yields in these crops.

The root crop on the Experimental Farm was, strange to say, for such a year, a poor one. The roots came up well, and for some time gave great promise, but on account of worms, flies and winds, that promise was not fulfilled, and when taken up the crops of turnips, mangels, carrots and potatoes were found to be very small. Throughout the Territories, however, the crop of roots and vegetables has been a large one. The failure on the experimental farm was mainly due to repeated winds, as in plots protected by hedges and wind-breaks, the same varieties produced yields three times greater than those grown in the open fields.

For tree-culture the season was very favourable. Starting to grow early in April, everything was in leaf by 1st May. The heavy frosts about middle of that month, however, killed all young and tender shoots, putting them back considerably, but the check was of very short duration, and in no previous year has the progress made by all the trees growing on the farm, been so satisfactory.

Weeds have been very troublesome the past year on this farm, especially the Tumbling Mustard (*Sisymbrium Sinapistrum*), which seems to have a special liking for the hedges and shelter belts on the farm, and it has required an endless amount of labour to keep it within bounds.

Several very bad weeds are obtaining a foothold in almost every district in Assiniboia; the principal of which are, Tumbling Mustard (*Sisymbrium Sinapistrum*), Hare's Ear Mustard (*Erysimum orientale*), and French or Stink weed (*Thlaspi Arvense*).

The rain fall during the growing season was largely in excess of the average for the past six seasons. A very rank growth of straw was the result, making harvest work and threshing heavy and expensive.

EXPERIMENTS WITH WHEAT.

The wheat tests on the Experimental Farm, the past year, were on the whole satisfactory. In no year have we had better samples or anything approaching such large yields. The straw as a rule was not badly lodged, and the heads were large and well filled. A few plots were injured slightly by frost, but not enough to decrease the yield.

In fields and acre tests, the results in all cases were not very satisfactory. A field of thirty acres was badly blown when the grain was just above ground, one-half of the field being injured to such an extent, that when frost came on 30th August the grain was still green. The yield on this portion was small, and the grain a very poor sample. On the part that escaped injury the return was a large yield of excellent grain.

Acre lots of Ladoga, Red Fern and Wellman's Fife were not seriously injured by winds and gave good returns, but Stanley, Alpha, Percy, Mars, White Connell and White Fife, in the same test, were so much hurt, and the growth retarded so long, that frost overtook them before they came to maturity.

All the new cross-bred varieties did well, producing large yields of very fine grain. Following will be found the tests in detail, with remarks on results:—

WHEAT FIELD LOTS.

Thirty acres of Red Fife were sown on one field of fallowed land, on 8th April. The soil was a good sandy loam.

Fifteen acres of the field were exposed to winds and suffered greatly by them; not only were large portions blown out but considerable areas were covered with dust from other parts of the farm. Where the grain was not so injured the crop was a good one.

One-tenth acre of a fair average of the crop on the portion that escaped the winds, was cut and threshed separate from the field to determine the difference, if any, between the yield of one-tenth acre and of the whole field.

The one-tenth acre plot gave 252 lbs. of grain or 42 bushels per acre ; the portion of the field not injured by winds yielded 41·20 bushels, and the whole field, 30 acres, 35 bushels per acre. The grain grown on the injured 15 acres was badly frozen and is a poor sample. There was no rust or smut in the field.

Name of Variety.	Size of Plot.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, per acre.	Yield per Acre.	Weight per Bushel.
	Acres.			Inches.		Inches.		Lbs.	Bush. lbs.	Lbs.
Red Fife—Drill	15	Sept. 7..	152	48	Fair	3½	Bald ...	5,850	28 40	59
do do	5	do 7..	151	48	do	3½	do ...	6,240	41 20	62
do —Press drill.	10	Aug. 22..	135	49	do	3½	do ...			

WHEAT—TEST OF VARIETIES.

Thirty-seven varieties were sown on same day, 16th April, on one-tenth acre plots, and six sorts, the last on the list, on one-eightieth acre plots. The soil was clay loam. All were put in by an ordinary drill on fallow, with no harrowing before or after seeding.

All the varieties produced a very heavy crop of straw, and a few of the bearded sorts whose straw was weak, lodged slightly, necessitating cutting one way, but in no case was the yield affected by lodging.

The sample of grain in the cross-bred varieties is much heavier than any ever before grown on the farm, and the yield per acre is also ahead of any previous year.

One variety, Colorado, shelled considerably before being cut, which is the cause of its small yield.

No rust or smut affected any of the varieties in this test.

WHEAT—Test of varieties, all sown same date.

Name of Variety.	Date of Ripen- ing.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Bush. lbs.	Lbs.
Beaudry.....	Aug. 30..	136	49	Weak..	3 $\frac{1}{2}$	Bald.....	6,390	52	64
Huron (cross-bred).....	Sept. 1..	138	50	Fair....	3 $\frac{1}{2}$	Bearded..	6,220	51 20	64
Emporium.....	do 1..	138	48	do	3	do ..	6,780	48 40	60 $\frac{1}{2}$
Crown (cross-bred).....	do 1..	138	50	do	3 $\frac{1}{2}$	do ..	6,210	46 40	61 $\frac{1}{2}$
Preston do	do 1..	138	57	do	3	do ..	6,800	45 40	64
Alpha do	Aug. 29..	135	47	do	3 $\frac{1}{2}$	do ..	6,250	45 30	63 $\frac{1}{2}$
Red Fife.....	do 30..	136	55	Stiff....	3 $\frac{3}{4}$	Bald.....	6,300	45	62 $\frac{1}{2}$
Herisson Bearded.....	Sept. 1..	138	44	do	4 $\frac{1}{2}$	Bearded..	6,020	44 40	65 $\frac{1}{2}$
Pringle's Champlain.....	Aug. 30..	136	46	do	3	do ..	6,130	44 30	63
Blenheim (cross-bred)..	Sept. 1..	138	48	do	3 $\frac{1}{4}$	do ..	6,190	44	61 $\frac{1}{4}$
Advance do	do 1..	138	58	Fair....	4	do ..	6,300	43 50	62 $\frac{3}{4}$
Dion's.....	Aug. 29..	135	46	do	3	do ..	6,210	43 20	61 $\frac{1}{4}$
Rideau (cross-bred).....	do 30..	136	49	Weak..	3 $\frac{1}{2}$	Bald.....	6,340	43 20	64
Wellman's Fife.....	Sept. 1..	138	56	Stiff....	4	do	6,000	42 40	61 $\frac{1}{2}$
Old Red River.....	do 1..	138	50	do	2 $\frac{3}{4}$	do	6,420	42 20	63 $\frac{1}{2}$
Red Fern.....	do 1..	138	48	Weak..	3 $\frac{1}{2}$	Bearded..	6,270	42 20	62 $\frac{3}{4}$
White Fife.....	do 3..	140	51	Stiff....	4	Bald.....	6,000	42 10	63
Stanley (cross-bred).....	Aug. 29..	135	48	Fair....	3 $\frac{3}{4}$	do	6,090	42	63
Rio Grande.....	do 29..	135	47	do	4	Bearded..	6,140	41 40	62
Ladoga.....	Sept. 1..	138	47	do	3 $\frac{1}{2}$	do ..	6,100	41 35	63 $\frac{1}{4}$
Black Sea.....	Aug. 30..	136	50	Weak..	4	do ..	6,500	41 10	63
Campbell's White Chaff.....	do 30..	136	45	Stiff....	2 $\frac{1}{4}$	Bald.....	6,210	40 20	63
Percy (cross-bred).....	do 29..	135	44	Fair....	3	do	5,900	39 40	62 $\frac{1}{2}$
Major do	do 30..	136	55	do	3 $\frac{3}{4}$	Bearded..	6,440	37	60 $\frac{3}{4}$
White Russian.....	Sept. 1..	138	46	do	2 $\frac{1}{2}$	Bald.....	5,980	36 10	61 $\frac{3}{4}$
Gehun.....	Aug. 26..	132	48	do	3 $\frac{1}{4}$	do	3,800	36	65 $\frac{1}{2}$
Monarch.....	Sept. 1..	138	49	do	4	do	5,980	36	60 $\frac{1}{2}$
Ottawa (cross-bred)	Aug. 19..	125	52	do	3 $\frac{1}{2}$	Bearded..	6,200	35 40	61
A No. 1 do	do 19..	125	50	do	3 $\frac{3}{4}$	do ..	6,120	35 40	61 $\frac{3}{4}$
Hungarian Bearded.....	do 27..	133	46	Weak..	3 $\frac{1}{2}$	do ..	6,400	35 20	60
White Connell.....	Sept. 3..	140	52	Stiff....	3	Bald.....	5,900	35 20	61
Admiral (cross-bred)	do 1..	138	48	Fair....	3 $\frac{1}{2}$	do	5,900	35 10	62
Mars.....	do 1..	138	43	Stiff....	2 $\frac{3}{4}$	do	6,020	35	63
Prince (cross-bred).....	Aug. 19..	125	54	Fair....	4	Bearded..	6,500	34 50	63 $\frac{1}{4}$
Goose.....	do 29..	135	47	do	3 $\frac{1}{4}$	do ..	6,000	33 20	62 $\frac{3}{4}$
Golden Drop.....	Sept. 2..	139	51	Stiff....	3	Bald.....	5,950	33 10	63
Colorado.....	Aug. 27..	133	46	Fair....	3 $\frac{3}{4}$	Bearded..	6,000	29 10	64 $\frac{1}{2}$
Captor (cross-bred).....	do 30..	136	47	do	3 $\frac{3}{4}$	do ..	6,300	28	62
Vernon do	Aug. 29..	135	46	Stiff....	3	do ..	Not weighed.	42 37	61 $\frac{1}{2}$
Progress do	Sept. 2..	139	44	Weak..	3 $\frac{1}{2}$	Bald.....		28 52	59 $\frac{1}{2}$
Dufferin do	do 2..	139	43	do ..	3 $\frac{1}{2}$	Bearded..		24 35	60
Countess do	do 2..	139	40	Fair....	2 $\frac{1}{2}$	Bald.....		23 22	61 $\frac{1}{2}$
Dawn do	do 2..	139	34	do	3	do		20 37	60

WHEAT—RESULTS OF EARLY, MEDIUM AND LATE SOWING.

In the above test, two varieties of wheat were sown; the first seeding being done at the earliest possible date and repeated on the same day each week for six sowings. The land was a good sandy loam which was summer-fallowed and in good condition; the seed was sown by the ordinary drill and no harrowing done either before or after seeding. The size of the plots was one-tenth of an acre each. The three first seedings gave the most satisfactory returns. The fourth and fifth plots were slightly touched by frost and the last sown considerably so. No rust or smut affected any of these plots.

The average of four years is in favour of early seeding, but the best results from a point of yield have been obtained by sowing about one week after the season opens up; the land then being in better condition.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				Inches.		Inches.		Lbs.	Bush.	lbs.	Lbs.
Red Fife....	Apr. 2.	Aug. 23..	143	54	Stiff.....	4	Bald ...	637	44		62
do	do 9.	do 27..	140	50	do	3 $\frac{3}{4}$	do	629	45	50	61 $\frac{1}{2}$
do	do 16.	do 29..	135	52	do	3 $\frac{3}{4}$	do	630	43	5	62
do	do 23.	do 30..	129	48	do	3 $\frac{3}{4}$	do	635	38	10	61
do	do 30.	Sept. 5..	128	49	do	3 $\frac{3}{4}$	do	620	39		60
do	May 7.	do 9..	125	47	do	3 $\frac{3}{4}$	do	684	35	50	57
Stanley.....	Apr. 2.	Aug. 19..	139	50	do	3 $\frac{3}{4}$	do	600	39		63 $\frac{1}{2}$
do	do 9.	do 27..	140	46	do	3 $\frac{3}{4}$	do	621	41	40	61 $\frac{1}{2}$
do	do 16.	do 27..	133	47	do	4	do	617	39	10	61 $\frac{1}{2}$
do	do 23.	do 30..	129	48	do	3 $\frac{1}{2}$	do	630	38	20	60
do	do 30.	Sept. 5..	128	47	do	3 $\frac{3}{4}$	do	625	34	20	60
do	May 7.	do 9..	125	46	do	3 $\frac{3}{4}$	do	640	34	40	56

ACRE LOTS OF WHEAT.

Nine varieties of wheat were sown on plots of one acre each. The soil varied in character from sandy to clay loam.

Two of these were so badly injured by winds that they were cut for fodder. Ladoga, Red Fern and Wellman's Fife were not hurt, and were ripe when frost came; but the balance—Stanley, Alpha, White Connell and White Fife—were late, and were more or less frozen. No rust or smut affected any of these varieties.

Name of Variety	Date of sowing.	Date of ripening.	No. of days maturing.	Length of straw.	Character of straw.	Length of head.	Kind of head.	Weight of straw per acre.	Yield per acre.		Weight per bushel.
									Bus. lbs.	Lbs.	
Wellman's Fife.	April 11	Aug. 31	142	50	Fair....	3 $\frac{1}{2}$	Bald ...	5,100	36	6	61
Red Fern.....	" 11	" 29	140	49	Weak ..	4	Bearded	5,100	34	48	62 $\frac{1}{2}$
White Fife.....	" 11	Sept. 2	144	47	Fair....	3 $\frac{1}{2}$	Bald ...	4,900	34	14	63
Alpha.....	" 13	" 2	142	51	" ...	3	" ...	4,950	32	41	63
Ladoga.....	" 11	Aug. 29	140	48	" ...	3	Bearded	5,000	31	24	63
Stanley.....	" 15	" 31	138	52	" ...	4 $\frac{1}{2}$	Bald ...	5,000	30	...	62
White Connell..	" 11	Sept. 7	149	45	" ...	3	" ...	4,900	28	30	61 $\frac{1}{2}$
Percy.....	" 13	" 7	147	52	" ...	4	" ...	cut for	feed.		
Mars.....	" 11	" 7	149	53	" ...	4	" ...	"	"		

TEST OF BLUESTONE AS A PREVENTIVE OF SMUT.

In this test $\frac{1}{10}$ th acre plots of summer-fallow were sown by drill on 17th April.

Good clean seed and seed very badly affected by smut were used; the smutty seed being the product of untreated smutty wheat sown in 1894 and was totally unfit for feed or for commercial purposes.

Three plots of ground were sown with good seed, one was sprinkled with the solution of bluestone, one was dipped and one was untreated.

One pound of bluestone was dissolved in 1½ pails of water, and the solution sprinkled over 8 bushels of seed, which was then turned five or six times or until thoroughly mixed. In dipping, bluestone and water in the same proportions were put in a barrel and the grain in bags dipped in the solution until soaking wet, then allowed to drip from the top of the barrel for a few minutes and afterwards dried in bags. As will be seen dipping gave the more satisfactory result.

The result of the test of sowing very smutty seed proves the efficiency of bluestoning as a preventive of smut. While the untreated was more than one-half smut, the product of the same seed treated contained 40 times more good than smutty heads; the yield per acre was also greater of the treated, 36·30 bushels of No. 1 Hard wheat and of the untreated, 17·40 bushels of grain and smut unfit for feed or market.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw, per acre.	Yield per acre.	Weight per bushel.	Good and Smutty heads on 6 feet square of plot.	
			Inches.		Inches.	Lbs.	Bush. lbs.	Lbs.	Good.	Smutty.
<i>Good Seed from treated crop 1894.</i>										
Red Fife, Sprinkled 1 lb. to 8 bus.	Aug. 28..	133	47	Stiff	3½	6310	40	60½	1709	5
Red Fife, Dipped 1 lb to 8 bus.	do 28..	133	49	“	3½	6500	42	60½	1525	0
Red Fife, untreated	do 28..	133	48	“	3½	6000	40 10	61½	1589	34
<i>Smutty Seed from untreated crop 1894.</i>										
Red Fife, 1 lb. to 8 bush.	do 31..	136	40	“	4½	599	36 30	60	1626	41
Red Fife, untreated	do 31..	136	48	Fair	4	580	17 40	48	718	833

WHEAT.—Test of sowing different quantities per acre. Sown 17th April on good, sandy loam, on plots of 1/10th acre each.

Name of variety.	Date of ripening.	No. of days Maturing.	Length of straw.	Character of straw.	Length of head.	Kind of head.	Weight of straw per acre.	Yield per acre.	Weight per bushel.	Proportion rusted.
					In.		Lbs.	Bush. lbs.	Lbs.	
Red Fife, 1 bush..	Sept. 1...	137	46	Stiff ..	3½	Bald .	5900	37 50	60	No rust ; no smut.
do 1¼ “ ..	do 1...	137	50	Stiff ..	3¼	Bald .	6550	44	60½	“ “
do 1½ “ ..	do 1...	137	45	Stiff ..	3¼	Bald .	6210	42 20	60	“ “

As shown in the above test, $1\frac{1}{4}$ bushels per acre gave the best yield of grain and straw. The average result for four years is also in favour of $1\frac{1}{4}$ bushels of seed per acre.

AVERAGE YIELD FOR 4 YEARS.

Name of Variety.	1892.		1893.		1894.		1895.		Average yield.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Red Fife—1 bushel per acre.....	38	50	28	20	14	30	37	50	29	52
do $1\frac{1}{4}$ bushels per acre.....	40		28		11	40	44		30	55
do $1\frac{1}{2}$ bushels per acre.....	39	40	26	30	13	20	42	20	30	27

WHEAT.—Test of sowing wheat at different depths. Sown 17th April on clay loam in plots of $\frac{1}{10}$ th acre each.

Name of Variety.	Date of ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.		Weight per bushel.
			Inches.		Inches.		Lbs.	Bush.	lbs.	Lbs.
Red Fife— 2 inches deep....	Aug. 28..	133	46	Stiff	4	Bald.....	6410	45		62
3 inches deep....	Aug. 28..	133	46	Stiff	4	Bald.....	6000	37	30	61 $\frac{1}{2}$

In the above test the difference between sowing wheat 2 inches deep and 3 inches deep is very marked. In wet seasons the result has invariably been in favour of 2 inches deep ; whereas, 3 inches deep has usually produced better returns in dry seasons.

AVERAGE FOR 4 YEARS.

Name of Variety.	1892.		1893.		1894.		1895.		Average yield.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Red Fife—2 inches deep.....	27		41	20	15	20	45		32	10
do 3 inches deep.....	22	30	37	10	18		37	30	28	47

WHEAT—Test of Press drill *vs.* ordinary drill, sown 17th April on good sandy loam : size of plots $\frac{1}{10}$ th acre each.

Name of Variety.	Date of Ripening.	No of days. Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.	Proportion rusted.
			In.		In.		Lbs.	Bush. lbs.	Lbs.	
Red Fife—										
Press drill.....	Aug. 28..	133	50	Stiff..	$3\frac{1}{4}$	Bald..	6820	45	$60\frac{1}{2}$	No rust or smut.
Ordinary.....	Sept. 1..	137	45	Stiff..	$3\frac{1}{4}$	Bald..	6400	44	60	“ “

As will be seen in the result given, the press-drill produced one bushel more grain and 420 lbs. more straw per acre than ordinary drill, and the grain matured 4 days earlier.

AVERAGE YIELD FOR 4 YEARS.

Name of Variety.	1892.		1893.		1894.		1895.		Average yield.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Red Fife—Press drill.....	30	20	38	20	18	40	45		33	5
do Ordinary drill.....	24		36	18	17	50	44		30	32

FALL *vs.* SPRING-PLOUGHING AND SUMMER FALLOW.

In this test, Red Fife wheat was used.

One-half acre was ploughed in the fall of 1894 and sown on 9th April, 1895, at the rate of $1\frac{1}{2}$ bushels per acre.

A second half acre was first sown at the rate of $1\frac{1}{2}$ bushels per acre, also on 9th April, then gang-ploughed 3 inches deep and well harrowed.

For comparison one-half acre of Red Fife on fallow sown on same date, is given though this was not grown in the same field. The soil in each instance was a good sandy loam.

The result is greatly in favour of fallow. As between fall and spring-ploughing the returns are very considerably in favour of fall ploughing. This was caused by the grain on the fall ploughing coming up at once and continuing to grow until ripe ; while that sown on the half acre ploughed this spring did not come up until the first week in June (after the rains came) and although it produced a good crop of straw the grain was caught by the frost on 30th August and greatly damaged.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, $\frac{1}{10}$ -acre.	Yield per Acre.		Weight per Bushel.	Proportion Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Red Fife—Fall ploughing..	Aug. 27.	140	48	Stiff..	$3\frac{1}{2}$	Bald..	520	33	45	61	No smut ; no rust.
do —Spring do	Sept. 7.	151	46	do ..	$3\frac{1}{4}$	do ..	500	22	30	60	do do
do —Summer fallow ..	Aug. 22.	135	49	Fair..	$3\frac{1}{2}$	do ..	624	41	20	62	do do

EXPERIMENTS WITH BARLEY.

Barley was an exceptionally good crop the past season, some varieties producing very large yields of both grain and straw.

One field of six and a half acres of Odessa barley was particularly fine and a 3 acre field of Carter's Prize Prolific was extra good but lodged badly and contained a considerable quantity of smut. Smut was very bad in many of the varieties, especially among the 6 rowed sorts in the test of varieties sown on the same date. One plot, Phoenix, was so bad that when cut it was not fit to thresh. Little or no smut, however, was found in any of the varieties, the seed of which had been treated with bluestone.

Frosts on 10th and 11th May cut the barley crop to the ground and it was again frozen back on 20th of same month. On the 28th May, a very heavy rain, followed by warm weather caused the crop to make rapid growth, and succeeding rains helped to insure the largest yield of grain and straw ever raised on the farm.

BARLEY, FIELD LOTS.

Seven varieties of barley were sown in fields of from one to five acres in extent.

All were sown by drill on fallow, the soil was a good sandy loam.

The yield of grain and straw in all cases was very large and the grain is a good sample.

Two varieties, Newton and Prize Prolific were smutty, the others were free from smut, none of them were rusted.

Name of Variety.	Size of plot.	Date of sowing.	Date of ripening.	Number of days maturing.	Length of straw.	Character of straw.	Length of head.	Kind of head.	Weight of straw per acre.	Yield per acre.		Weight per bushel.
	Ac.				In.		In.			Bus.	Lbs.	Lbs.
Odessa	5	April 30	Aug. 19	120	44	Fair ...	3	6 rd	5,890	64	18	53
Prize Prolific.....	3	May 2	Sept. 4	125	43	Weak ..	4 $\frac{3}{4}$	2 "	6,010	60	30	49
California Prolific..	4	do 3	Aug. 17	106	48	Stiff ...	3	2 "	5,900	56	15	52 $\frac{1}{2}$
do ..	3	do 3	do 30	119	54	do ...	3	2 "	6,170	55	25	52
Gold thorpe.....	2	do 1	do 27	118	40	do ...	3	2 "	5,950	53	22	51 $\frac{3}{4}$
Kinver.....	1	do 1	Sept. 4	126	40	Weak ..	5	2 "	6,000	52	28	50 $\frac{1}{2}$
Oderbruch	2	do 3	Aug. 27	116	40	Stiff ...	3	6 "	5,890	50	17	52 $\frac{1}{2}$
Newton.....	2	do 1	do 27	118	41	do	3	2 "	5,950	48		52 $\frac{1}{2}$

BARLEY—RESULTS OF EARLY, MEDIUM, AND LATE SOWING.

In this test two sorts were sown, Canadian Thorpe, a two-rowed variety, and Oderbruch, a six-rowed sort. The first seeding was done on April 16, and subsequently on the same day each week for six sowings.

The tests were made on fallow land, a good sandy loam, in plots of one-tenth acre each, sown by ordinary drill, without harrowing before or after seeding.

The first three seedings were well up on May 10, when they were cut back by frost. These were again, with fourth and fifth seedings, cut back by the next frost on May 20.

Little or no difference could be observed in any of the plots, so far as the crop of straw was concerned and all were late in maturing. The two-rowed sorts were from six to nine days longer in coming to maturity than the six-rowed varieties. There was no rust or smut affecting any of these plots.

The results of this test indicate the first and second week in May as being the best time to sow barley, which is also the time indicated by tests carried on during the past four years.

BARLEY.—Test of Early, Medium and Late Sowings.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bus. lbs.	Lbs
Oderbruch.....	April 16..	Aug. 27..	133	44	Stiff ...	3	6 rowed..	320	46 42	51
do	do 23..	do 27..	126	44	do ..	2 ³ / ₄	do ..	364	47 34	50
do	do 30..	do 27..	119	45	do ..	2 ³ / ₄	do ..	375	48 46	50
do	May 7..	do 27..	112	43	do ..	2 ³ / ₄	do ..	399	53 6	50
do	do 14..	do 24..	102	40	do ..	2 ³ / ₄	do ..	405	56 12	51
do	do 21..	do 24..	95	41	do ..	2 ³ / ₄	do ..	385	48 26	51
Canadian Thorpe.....	April 16..	Sept. 4..	141	42	do ..	2 ³ / ₄	2 rowed..	360	53 16	48
do	do 23..	do 2..	132	46	do ..	2 ³ / ₄	do ..	375	41 42	50
do	do 30..	do 4..	127	49	do ..	2 ³ / ₄	do ..	380	45 30	50
do	May 7..	do 2..	118	47	do ..	2 ³ / ₄	do ..	378	52 14	47
do	do 14..	do 5..	114	45	do ..	2 ³ / ₄	do ..	390	56 12	47
do	do 21..	do 4..	106	46	do ..	2 ¹ / ₂	do ..	400	45 90	46

BARLEY, TEST OF VARIETIES.

Thirty-six varieties of barley were sown in this test, all on the same date, 1st May, 18 of them two-rowed and 18 of six-rowed.

The test was made on one-tenth acre plots of fallow land, soil a good sandy loam ; sown by ordinary drill and not harrowed before or after seeding.

All the sorts were several inches high when cut back by frost on 10th and 20th May. Winds also injured several of the six-rowed varieties but the two-rowed sorts escaped, they being on less exposed ground.

As previously stated, smut was very prevalent in several of the two-rowed, and especially so, in the six-rowed varieties.

The small returns from the six-rowed sorts, in comparison with the two-rowed, were caused principally by winds blowing the earth off the roots, thereby allowing frost to kill the plants—while young.

BARLEY, Six-rowed—Test of Varieties all sown on same date.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per acre.	Yield per Acre	Weight per Bushel.	Proportion Smutty.
			In.		In.	Lbs.	Bush. Lbs.	Lbs.	
Rennie's Improved	Sept. 5	128	43	Weak ..	5	3,000	62 14	52 ¹ / ₄	A little smut.
Odessa	Aug. 24	116	40	Fair....	3	4,660	54 28	53 ¹ / ₄	Smutty.
Success.....	" 16	108	39	Stiff....	2 ³ / ₄	2,750	45 40	49 ¹ / ₄	"
Trooper	" 30	122	37	"	3	2,700	45 40	52 ¹ / ₂	"
Mensury	" 24	116	46	Fair....	3 ¹ / ₂	4,200	43 36	51	A little smut.
Nugent	" 27	119	38	"	2 ³ / ₄	3,820	42 34	51 ³ / ₄	"
Royal	" 26	118	39	Stiff....	3 ³ / ₄	2,200	41 42	52 ¹ / ₄	Smutty.
Stella	Sept. 2	125	38	"	3	2,320	41 32	51 ³ / ₄	A little smut.
Excelsior.....	Aug. 19	111	39	"	3 ¹ / ₄	2,910	41 32	47 ¹ / ₄	"
Common	" 24	116	42	"	3	4,600	41 20	52 ¹ / ₂	Smutty.
Summit	" 30	122	38	"	3 ¹ / ₂	2,400	40 30	52 ³ / ₄	"
Baxter's	" 24	116	44	"	2 ¹ / ₄	3,910	40 20	52 ³ / ₄	"
Oderbruch.....	" 24	116	43	"	3	3,940	40	52	A little smut.
Surprise	" 30	122	38	"	3 ¹ / ₂	2,750	38 26	52 ¹ / ₂	Smutty.
Vanguard	" 24	116	38	"	3 ¹ / ₄	2,890	37 24	52	"
Champion	" 19	111	40	"	3 ² / ₂	3,320	37 24	46	A little smut.
Petschora.....	" 20	112	38	Fair....	3	3,220	31 29	51 ³ / ₄	Smutty.
Phoenix.....	" 30	122	39	"	2 ¹ / ₂	.....	.....	.....	Discarded ; ³ / ₄ smut.

BARLEY, Two-rowed—Test of Varieties all sown on same date.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre	Yield per Acre	Weight per Bushel.	Proportion Smutty.
			In.		In.	Lbs.	Bush. Lbs.	Lbs.	
Prize Prolific.....	Sept. 4	127	40	Weak ..	4	6,000	59	49 $\frac{1}{4}$	Smutty.
Kinver Chevalier	" 4	127	32	" ..	4 $\frac{1}{2}$	5,750	56 22	50	A little smut.
Thanet.	" 4	127	38	" ..	4	5,800	54 40	51 $\frac{3}{4}$	Smutty.
French Chevalier.....	" 2	125	35	" ..	5 $\frac{1}{2}$	5,440	54 38	49 $\frac{3}{4}$	A little smut.
Danish Chevalier.....	" 2	125	38	" ..	4 $\frac{3}{4}$	5,800	54 18	49 $\frac{1}{2}$	"
Beaver	" 2	125	37	Stiff....	3 $\frac{1}{2}$	4,850	52 4	51 $\frac{3}{4}$	No smut.
Canadian Thorpe.....	Aug. 30	122	41	"	3	5,550	50 6	52 $\frac{1}{2}$	Smutty.
Rigid.....	" 27	119	40	"	3	2,320	48 16	52 $\frac{1}{2}$	"
Newton	" 30	122	40	"	4	5,400	48 5	52 $\frac{1}{2}$	"
California Prolific.	" 30	122	40	"	3 $\frac{1}{2}$	5,000	48	52 $\frac{1}{2}$	"
Bolton... ..	Sept. 2	125	42	Weak ..	4	4,800	46 10	52 $\frac{1}{2}$	"
Improved Chevalier.	" 2	125	43	Fair....	4 $\frac{1}{2}$	5,800	45 10	52	A little smut.
Goldthorpe.....	" 2	125	40 ^m	Stiff....	2 $\frac{3}{4}$	5,650	45	52 $\frac{1}{2}$	Smutty.
Golden Melon	" 5	128	40	Weak ..	4 $\frac{1}{2}$	5,910	45	49 $\frac{1}{2}$	A little smut.
Duck-bill.....	Aug. 31	123	38	Stiff....	3	5,000	45	53	Smutty.
Sidney	" 29	121	37	Fair....	4	5,000	42 44	51 $\frac{1}{2}$	A little smut.
Pioneer.....	" 30	122	40	"	4	4,800	38 10	52 $\frac{3}{4}$	Smutty.
Monty (feed).....	" 30	122	32	Weak ..	4	2,000	30 10	61 $\frac{1}{2}$	No smut.

TEST OF SPRING vs. FALL-PLOUGHING AND SUMMER FALLOW.

California Prolific barley was used in the above test. All the plots were sown on 3rd May.

One-half acre of stubble was ploughed in fall of 1894, and sown by drill on 3rd May, 1895 Another half acre stubble was sown by drill and ploughed on same date, and one-half acre was sown on fallow.

The crop of straw on all the plots, was heavy, but the heads were small and the sample of grain only fair on spring and fall ploughing.

From the following table it will be seen that in comparison with the same variety grown on fallow the yields of fall and spring ploughing are very small. No rust or smut was found on any of these plots.

Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.
			In.		In.		Lbs. Bush. Lbs.	Lbs.	
California Prolific (spring ploughing).....	Aug. 23.	112	39	Weak	2 $\frac{1}{2}$	2 rowed...	5,000 33	36	50
California Prolific (fall ploughing).....	do 23.	112	42	Stiff	3	do ...	5,450 31	32	49
California Prolific (fallow).....	do 17.	106	48	do	3	do ...	5,900 56	15	52

EXPERIMENTS WITH OATS.

Forty-nine varieties of oats were tested during the past season; 5 black and 44 white varieties.

Like the barley, the crop was cut back by frosts on the 10th, 11th and 20th of May. Wind also did considerable damage to a few varieties; and smut caused a reduced yield in sorts not bluestoned.

On the whole, however, the crop was the best ever harvested on the Experimental Farm.

OATS—TEST OF EARLY, MEDIUM AND LATE SOWING.

Two varieties of milling oats were used in this test and sown by ordinary drill on fallow. The soil was a good sandy loam and the size of the plots one tenth of an acre each.

All but the last sowing were cut back by frosts on the 10th, 11th and 20th May. The growth was so even afterwards that, while growing, no difference could be observed in any of the plots, and when threshed the yields of grain and straw varied very slightly.—No rust or smut was seen on any of these plots.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.
Banner	April 16..	Sept. 3...	140	51	Stiff....	11	Branch.	6,000	81	16
do	do 23..	do 5...	135	50	do	11	do ..	6,300	82	22
do	do 30..	do 5...	128	52	do	10½	do ..	6,400	88	8
do	May 7..	do 3...	119	51	do	10	do ..	6,000	86	16
do	do 14..	do 1...	110	49	do	10½	do ..	6,400	93	18
do	do 21..	do 1...	103	48	do	11	do ..	6,130	80	..
Abundance.....	April 16..	do 2...	139	54	do	9½	do ..	5,710	85	10
do	do 23..	do 5...	135	52	do	10½	do ..	5,990	81	6
do	do 30..	do 2...	125	56	do	10	do ..	6,020	85	11
do	May 7..	do 5...	121	54	do	10	do ..	6,300	80	10
do	do 14..	do 2...	111	55	do	10½	do ..	6,300	89	4
do	do 21..	do 2...	104	54	do	11	do ..	6,410	87	2

FIELD CROPS OF OATS.

Six varieties of oats were sown on fields of from 2 to 18 acres each. Soil all good sandy loam.

Eighteen acres of Banner were sown in one field, on fallow land. The field was gang-ploughed, then sown by drill at the rate of 2½ bushels per acre; then harrowed and after the grain came above ground another stroke of the harrow was given. One-tenth acre of this field, cut and threshed separately, gave a yield of 99·30 bushels per acre, and the whole 18 acres, when threshed, produced 1,710 measured bushels, or 95 bushels per acre, weighing 38 lbs. per bushel. By weight the yield will exceed 106 bushels per acre.

Another field of Banner, 8 acres, the seed of which had not been bluestoned, drilled in on fallow, was so smutty as to be almost worthless. A large crop of straw was grown, but the yield was comparatively small, though the grain was a good sample. All the other fields were free from smut and no rust was observed on any of them.

The grain in all these fields was well up early in May but was cut back twice by frost in that month.

OATS—Field Lots.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	Weight per Bushel.
	acre				In.		In.		Lbs	Bush. lbs.	Lbs
Banner, on fallow, ganged first, drilled	18	April 19	Aug. 29	132	58	Fair..	10	Branch.	6300	95	39
Welcome, on fallow, drilled in..	5	do 22	do 29	129	48	do ..	9	do ..	5800	79 10	44
Hazlett's Seizure, fallow, drilled in	2	do 23	Sept. 3	132	58	do ..	10	do ..	6210	60 24	43
Cluster, fallow, drilled in	5	do 22	Aug. 29	129	54	do ..	10½	Side....	5990	70	45
Bonanza, meadow land, fallowed 1894, drilled	2	do 23	do 22	121	54	Weak	9	Branch.	6210	80 17	44
English White, meadow land, fallowed 1894, drilled	2½	do 24	do 17	116	49	Fair..	10	do ..	5950	75 32	43
Banner, fallow, drilled	8	May 4	do 22	111	48	do ..	9	do ..	6110	45	39

ACRE LOTS OF OATS.

Nine varieties of oats were sown on plots of one acre each.

The winds and frosts in May cut them all back so badly that only four varieties were worth saving for the grain and the others were cut for fodder. The yields were small in comparison with other tests with oats.

The nine varieties were sown on fallow land beside a field of Banner oats that yielded 95 bushels per acre, but were on an exposed portion of the field and suffered greatly from winds.

No rust was observed on any of these plots, but the varieties known as Flying Scotchman and Golden Beauty were considerably affected with smut.

Name of Variety.	Character of Soil.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.
					Inch.		Inch.		Lbs.	Bush. Lbs.	Lbs.
Black Champion	Sandy loam.	May 4.	Aug. 27.	115	45	Fair....	9½	Side....	6,150	56 30	37
Black Tartarian.....	" ..	" 4.	" 27.	115	46	Weak...	9	" ..	6,200	52	35
Flying Scotchman...	Clay loam ..	Apr. 30.	Sept. 3.	126	42	Fair....	9½	Branch.	5,800	50 19	42½
Golden Beauty	Sandy loam.	" 30.	" 3.	126	42	" ..	10	" ..	6,090	45 21	39
White Russian.....	Clay loam ..	" 30.	} Cut for feed.								
Scottish Chief.....	" ..	" 30.									
Early Gothland.....	" ..	" 30.									
Oderbruch	" ..	" 30.									
Royal Doncaster	" ..	" 30.									

OATS—TEST OF VARIETIES.

In this test forty-nine varieties were sown side by side, all on the 23rd of April, by drill on fallow land. The soil was sandy loam of good quality and the size of the plots was one tenth acre each.

All were cut back twice by frost in May, but made a very heavy growth of straw afterwards, and with the exception of five varieties produced large yields of fine grain.

The five sorts giving less than 60 bushels per acre were greatly injured by frost on 20th May, many of the plants being killed, and the crop was thus so delayed that autumn frosts occurred 30th August, before the grain was matured, hence it was light in weight. Four of the varieties yielded over 100 bushels per acre. No rust or smut was observed on any of these plots.

OATS—Test of Varieties, all sown on same date.

Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Bush. lbs.	Lbs.
Abundance.....	Sept. 7..	137	54	Fair...	10	Branching	6,300	108 28	38½
Golden Beauty.....	do 3..	133	50	Weak..	10½	do ..	6,210	104 4	40
Columbus.....	do 7..	137	51	do ..	9¾	do ..	6,200	102 2	38
American Beauty.....	do 4..	134	50	Fair...	9	do ..	6,230	101 16	40
White Schonen.....	Aug. 31..	130	47	Weak..	9	do ..	6,030	99 22	39
Oderbruch.....	Sept. 7..	137	50	Fair...	10½	Sided...	5,900	99 14	43
Challenge.....	Aug. 31..	130	48	Weak..	9½	Branching	6,200	91 6	43½
Banner.....	do 31..	130	50	do ..	11	do ..	5,980	90 ..	40¾
Holstein Prolific ..	Sept. 7..	137	51	do ..	10½	do ..	6,150	89 24	39½
Wide-awake.....	do 6..	136	56	Fair...	10	do ..	6,020	89 14	40
Early Archangel.....	Aug. 31..	130	47	do ...	9	do ..	6,050	88 8	43½
Improved Ligowo.....	Sept. 3..	133	48	Weak..	9	do ..	6,080	87 22	42½
Siberian.....	do 7..	137	58	do ..	10½	Sided....	6,130	86 26	37
Flying Scotchman.....	Aug. 31..	130	56	Fair...	9	Branching	6,000	86 16	43
Improved American.....	Sept. 11..	141	52	Stiff...	10	do ..	6,280	85 20	38
Bonanza.....	do 3..	133	48	Weak..	11	do ..	6,130	85 10	43¾
American Triumph.....	do 6..	136	46	Fair...	10	do ..	6,220	85 ..	38½
Cream Egyptian.....	Aug. 31..	130	51	Weak..	9½	do ..	6,000	82 32	43½
Abyssinia.....	Sept. 7..	137	50	Fair...	10½	Sided....	6,000	82 22	39½
Rosedale.....	do 7..	137	58	Weak..	9	do ..	6,130	81 16	40
Welcome.....	do 4..	134	54	Fair...	8	Branching	6,150	81 16	43
Winter Grey.....	Aug. 29..	128	54	do ...	9½	do ...	5,940	81 6	45½
Golden Giant.....	Sept. 7..	137	59	Weak..	10¾	Sided	6,170	80 30	36¾
Hazlett's Seizure.....	do 3..	133	52	do ..	11	Branching	6,200	79 14	43
Joanette.....	do 2..	132	39	do ..	9	do ...	5,870	78 28	36½
Victoria Prize White.....	Aug. 30..	129	50	do ..	9½	do ...	5,990	78 28	44½
Cave.....	Sept. 7..	137	47	Fair...	9	Sided	6,020	78 28	39½
Scottish Chief.....	do 3..	133	55	Weak..	9	Branching	5,950	77 22	42½
Bavarian.....	do 3..	133	51	Fair...	9	do ...	6,250	76 16	39½
White Russian ..	do 7..	137	52	Weak..	9	do ...	6,000	75 ..	41½
Early Blossom.....	do 7..	137	45	Fair...	10	Sided	6,170	75 ..	39
Lincoln.....	do 1..	131	48	do ...	10	Branching	5,900	73 28	40
Prize Cluster.....	Aug. 29..	128	48	Weak..	9	do ..	5,980	73 28	45
Early Golden Prolific.....	Sept. 7..	137	48	Fair...	10½	Sided	6,110	73 18	37¾
Prolific Black Tartarian...	do 3..	133	51	Weak..	9	do ...	5,950	72 22	36
White Wonder.....	Aug. 31..	130	54	do ..	9½	Branching	6,100	71 16	42
Giant Cluster.....	Sept. 7..	137	58	do ..	11	Sided	6,200	70 ..	35½
White Monarch.....	do 7..	137	48	Stiff...	10	Branching	6,100	69 24	39
Early Doncaster.....	do 7..	137	49	Weak..	8	do ...	5,990	69 4	40½
Poland White.....	do 7..	137	58	Stiff...	9½	do ...	5,970	69 4	43½
Rennie's Prize White ..	do 6..	136	56	do ...	12	do ...	6,210	67 13	40½
California Prolific Black...	do 3..	133	44	Weak..	8¾	Sided	5,920	67 12	35
Wallis.....	do 7..	137	57	do ..	9	Branching	6,210	67 12	39½
Imported Irish.....	Aug. 30..	129	61	Stiff...	9	do ...	6,310	63 8	46½
Coulommiers.....	Sept. 11..	141	44	Fair...	9	do ...	5,890	57 12	35¾
Early Gothland.....	Aug. 31..	130	45	Stiff...	10½	Sided	5,900	53 18	39½
Early Maine.....	Sept. 11..	141	40	do ...	9	Branching	5,950	51 6	35½
Early Etampes.....	do 4..	134	34	do ...	8¾	do ...	4,900	50 10	36½
Scotch Hopetown.....	do 7..	137	50	Weak..	10	do ...	5,900	45 20	39

OATS—FALL vs. SPRING PLOUGHING AND SUMMER FALLOW.

The same test was made with oats as with wheat and barley.

One-half acre of stubble was ploughed in fall of 1894, and sown on 16th April, 1895, at the rate of $2\frac{1}{2}$ bushels per acre. One-half acre of stubble was sown on 16th April, at the rate of $2\frac{1}{2}$ bushels per acre, and then ploughed and well harrowed. For comparison $\frac{1}{2}$ acre of the same variety of oats, sown on fallow, on 19th April, was cut and weighed. The fallow was separated from the stubble plots by a road only. The stubble sown had produced a crop of oats in 1894, and was fallowed the previous summer. The soil was a good sandy loam. No rust or smut was observed on either of these plots.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.
				In.		In.		Lbs.	Bush. Lbs.	Lbs
Banner (fall ploughing)...	Apr. 16.	Aug. 28.	134	48	Fair ...	9	Branching	5,950	35 29	38 $\frac{1}{4}$
do (spring ploughing)	do 16.	do 28.	134	48	do ...	9	do ...	6,000	40 10	38
do (summer fallow) ..	do 19.	do 29.	132	58	do ...	10	do ...	6,300	95 ..	39

EXPERIMENTS WITH PEASE.

Test of varieties, all sown same date.

Nine varieties were sown in this test, but unfortunately a high wind which occurred on September 23rd, shortly after the pease were pulled, mixed the varieties so badly that no accurate results can be given. The samples of pease of all the varieties are good.

Pease.—Test of early, medium and late sowing. In this test two varieties were sown on the same day, each week, for six weeks. They escaped being mixed by the wind but were badly threshed out on the ground, so that the yields are much smaller than they otherwise would have been. The soil was a good sandy loam and the size of the plots was one-tenth acre each.

The pease were well up early in May and suffered considerably from frosts in that month, so much so, that the weeds got a good start which was maintained till harvest.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per acre.	Weight per Bushel.
					In.	In.		Bush. Lbs.	Lbs
Mummy	April 16	Sept. 5	142	Strong .	48	2 $\frac{1}{2}$	Large ..	13 20	65
do	do 23	do 5	135	do ..	48	2 $\frac{1}{2}$	do ..	15	65
do	do 30	do 7	130	do ..	46	2 $\frac{1}{2}$	do ..	20 15	65
do	May 7	do 9	125	do ..	49	3	do ..	21 40	65
do	do 14	do 10	119	do ..	50	2 $\frac{1}{2}$	do ..	19 10	65
do	do 21	do 10	112	do ..	49	2 $\frac{1}{2}$	do ..	18 40	65
do	do 28	do 17	109	do ..	50	2	Small ..	17 50	64
Golden Vine.....	April 16	do 2	139	do ..	51	1 $\frac{3}{4}$	do ..	18 40	64
do	do 23	do 5	135	do ..	51	1 $\frac{3}{4}$	do ..	21 35	64
do	do 30	do 2	125	do ..	50	1 $\frac{3}{4}$	do ..	22 20	64
do	May 7	do 5	121	do ..	48	2	do ..	19 40	64
do	do 14	do 2	111	do ..	45	2	do ..	19 40	64
do	do 21	do 2	104	do ..	46	2 $\frac{1}{4}$	do ..	19 10	64

EXPERIMENTS WITH AWNLESS BROME GRASS.

Awnless Brome Grass (*Bromus inermis*) did exceedingly well the past year. Early in the season the prospects for a good crop were not bright but after the rain during the last week in May, the growth was very satisfactory.

The greater portion of the crop was saved for seed which has given an excellent sample and a large quantity of good seed will now be available for use on the farm and for the next distribution. In the neighbourhood of 30 acres is now under grass; and the coming year, with the large lot of seed on hand, the acreage will be greatly increased.

Five acres were sown in August last, and a good catch was obtained.

Several methods have been tried in sowing the grass but it has been found that on this farm (owing to winds) ploughing stubble early in May, then sowing grass seed by hand and harrowing well afterwards, has given the best results. It may be necessary to go over fields with a mower the first year, to cut the weeds and keep them from going to seed. Where winds are not troublesome sowing on a good clean fallow is recommended.

Reports from the Calgary district, show that large crops of this grass were obtained there the past year: in one case as much as five tons per acre having been grown.

YIELD of Five Acres of Awnless Brome Grass.

Variety.	No. of Acres.	Cured Hay per acre.		Date Cut.
		Tons.	Lbs.	
Bromus Inermis.....	4	2	1,200	July 24.
do	1	3	1,200	do 13.

EXPERIMENTS WITH MIXED GRAIN FOR FODDER.

Five tests were made with different mixtures of grain sown for fodder.

The two mixtures of oats and pease produced the best feed; while a combination of equal parts of oats and barley gave the largest crop. The mixture of equal parts of wheat, oats and barley turned out a smaller crop of poor feed.

All were sown by drill on fallow on plots of one-tenth acre each.

Mixture per Acre.	Sown.	Cut for	Date Cut.	Weight per Acre Green.		Weight per Acre Dry.	
				Tons.	Lbs.	Tons.	Lbs.
I. { 1 bush. Oats—Banner.....	May	2.	Feed....	6	800	3	500
{ 2 do Peas—Multiplier							
II. { 1 do Oats—Banner	do	2.	do ...	6	1,800	3	1,200
{ 1 do Peas—Multiplier							
III. { 1 do Oats—Banner.....	do	2.	do ...	7	1,900	4	200
{ 1 do Barley—Cal. Prolific							
IV. { 1 do Wheat—Red Fife	do	2.	do ...	4	600	2	1,400
{ 1 do Oats—Banner.....							
V. { 1 do Barley—Cal. Prolific	do	2.	do ...	4	100	2	700
{ 1½ do Spring Rye.....							

EXPERIMENTS WITH MILLETS, &c.

Four varieties of millet, also Hungarian grass and Canary grass were tested for fodder.

Two sorts of millet were ploughed under, as winds injured them and weeds began to get the start, the other two varieties did not fully mature but gave medium crops of hay.

Hungarian grass also gave a fair crop.

Canary grass produced a good crop of feed and is worthy of a more extended trial not only as a hay crop but for the seed, which fully matures in our seasons and is of excellent quality. Sown any time in May, it will come to maturity before the wheat harvest.



Fig. 1. Flax plant.

Name of Variety.	Date Sown.	Cut for	Date Cut.	Weight per Acre Dry.	
				Tons.	Lbs.
Millet—Common .	May 13....	Hay... ..	Aug 22....	1	1,145
do Golden...	do 13....	do	do 22....	1	800
do German..	do 21....	Ploughed under.			
do French...	do 21....	Ploughed under.			
Hungarian Grass..	do 13....	Hay	Aug 22....	1	900
Canary Grass.....	do 18....	do	do 17....	2	1,800

EXPERIMENTS WITH FLAX.

One plot of two acres and two plots of one-tenth acre each were sown on 6th and 13th May respectively.

The two acre plot was very weedy but gave a good crop of straw and a yield of 12 bushels per acre. The ground was manured in fall of 1893 and fallowed in 1894.

The one-tenth acre plots were almost entirely killed by winds and frosts in May, and were ploughed up. Figure 1 represents a flax plant in bloom.

EXPERIMENTS WITH RAPE.

A field of five acres was sown with rape seed for fodder on May 22nd.

Manure was spread over this field in the fall of 1894 and after the rush of seeding this spring, the field was deeply ploughed, then harrowed and sown with rape seed at the rate of 2lbs per acre. The crop was a heavy one. Cattle were turned on for a few hours each day, in the last week in August, and at this date, November 10th, continue to find good feed. Nothing grown on this farm has given better satisfaction as a fodder crop for fall use.

EXPERIMENTS WITH CORN.

Seventeen varieties of corn were sown and planted for fodder.

All the varieties were sown on fallowed land, in drills, three feet apart by drills using 2 spouts. They were also planted in hills three feet apart each way. The corn planted in hills produced a larger crop than that sown in rows.

Several times during the season cold winds cut the top leaves of the corn back, on one occasion over one foot. This with cold nights made the season a very unfavourable one for corn, and in consequence, all the varieties tested gave small returns.

In addition to the above tests, 10 acres were sown by drill for ensilage. One field of five acres was on spring-ploughing and the balance on summer fallowed land. This crop, like that of the test plots was a poor one.

CORN.—Test of Varieties—All sown on same date ; soil, clay loam ; size of plots, $\frac{1}{20}$ th acre each.

Name of Variety.	Date of Sowing.	Height.	When Tasselled.	In Silk.	Condition When Cut.	Weight per acre Grown in Rows.		Weight per acre Grown in Hills.	
		In.				Tons.	Lbs.	Tons.	Lbs.
Longfellow	May 21.	34	Aug. 22.	.....	In tassel	6	1,200	8	200
Canada White Flint.....	do 21.	36	Not.....	.....	.....	6	600	6	.....
Angel of Midnight.....	do 21.	40	Aug. 22.	.....	In tassel	6	.....	8	800
Champion White Pearl	do 21.	36	Not.....	.....	.....	5	1,400	6	600
Country Gentleman.....	do 21.	36	Aug. 22.	.....	In tassel	5	1,200	5	200
Mitchell's Early.....	do 21.	35	do 13.	Aug. 22.	In silk.....	5	800	6	600
Mammoth 8-rowed Flint	do 21.	36	Not.....	.....	.....	5	800	9	500
Compton's Early	do 21.	36	do .....	.....	.....	5	800	6	1,200
New White Cap Yellow Dent ..	do 21.	36	do .....	.....	.....	4	1,600	5	800
Extra Early Huron Dent.....	do 21.	35	do .....	.....	.....	4	100	6	.....
Giant Prolific.....	do 21.	36	do .....	.....	.....	3	1,800	6	600
Red Cob Ensilage.....	do 21.	38	do .....	.....	.....	3	1,800	6	1,800
Sanford White Flint.....	do 21.	37	do .....	.....	.....	3	1,200	5	800
Pearce's Prolific	do 21.	37	do .....	.....	.....	3	600	3	1,200
Canadian Dent	do 21.	38	do .....	.....	.....	3	600	4	400
Thoroughbred White Flint.....	do 21.	39	do .....	.....	.....	3	.....	6	.....
North Dakota.....	do 21.	40	Aug. 13.	Aug. 22.	In silk.....	2	1,300	5	800

EXPERIMENTS WITH POTATOES.

Seventy varieties were tested. The crops were not as large as was expected, considering the favourable season. The land was well fallowed the year previous and was in good condition. The soil was a good sandy loam, the size of the plots was $\frac{1}{60}$ th of an acre each. They were all planted on the 15th May and dug 4th October. No rotten potatoes were found in any of the varieties in this test.

A great many of the varieties were very scabby last year and part of the seed of each sort planted this spring was treated with bi-chloride of mercury 1 oz. dissolved in 15 gallons water and soaked for 1½ hours, before being planted. Little or no difference could be observed between the treated and untreated parts and those that were scabby last year were scabby still.

Nine of the seventy kinds were also planted in the garden. Before planting, the seed was soaked for 15 minutes in a solution of copper sulphate (bluestone 1lb dissolved in 1½ pails of water (with the result that the crop is entirely free from scab.

Following are names of varieties, yield per acre, size, shape, colour, etc.

POTATOES—Test of varieties.

Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Yield per Acre.				Form and Colour.
					Total.	Sound	Market-able.	Unmarketable.	
					Bush.	Bush.	Bush.	Bush.	
American Giant.....	Very strong.	Late ...	Large ..	Good.	352	352	320	32	Round, white.
White Beauty	Strong	do	Medium ..	do ..	332	332	312	20	Long, do
Lizzie's Pride.....	Very strong.	Medium ..	do ..	do ..	324	324	292	32	do do
Primrose	Strong	Early ..	Large ..	do ..	306	306	300	6	do pink.
London.....	Fair	Late ...	Medium ..	do ..	304	304	280	24	do do
Toronto Queen.....	Strong	do	do ..	do ..	296	296	280	16	do do
Early Harvest.....	do	Early ..	do ..	do ..	296	296	268	28	do white.
Late Puritan	do	Late ...	do ..	do ..	288	288	268	20	do do
Early Gem	do	Early ..	do ..	do ..	284	284	264	20	do pink.
Vanier	do	Late ...	do ..	do ..	280	280	252	28	do do
Early White Prize..	Very strong.	do	do ..	do ..	280	280	240	40	Round, white.
Rochester Rose	do	do	do ..	do ..	272	272	240	32	Long, pink.
State of Maine	Fair	do	do ..	do ..	264	264	236	28	Round, white.
Everett.....	Strong	Medium ..	Large ..	do ..	264	264	240	24	Long, pink.
Monroe Co.	Very strong.	Late ...	Medium ..	do ..	260	260	240	20	do do
Pearce's Prize Winner	Fair	Medium ..	do ..	do ..	260	260	224	36	do white.
Pearce's Extra Early	Strong	do	do ..	do ..	253	253	232	20	do pink.
Empire State.....	Very strong.	Late ...	do ..	do ..	248	248	232	16	do white.
Morning Star.....	Strong	Medium ..	do ..	do ..	236	236	220	16	do pink.
Sharpe's Seedling...	do	Early ..	do ..	do ..	232	232	216	16	do do
Carman No. 1	do	Late ...	do ..	do ..	228	228	200	28	Round, white.
Clarke's No. 1	Very strong.	Medium ..	Large ..	do ..	224	224	200	24	Long, pink.
Polaris.....	Strong	Early ..	do ..	do ..	224	224	204	20	Round, white.
Dakota Red	do	Late ...	Medium ..	do ..	224	224	204	20	do red.
Chicago Market.....	Fair	do	do ..	do ..	220	220	200	20	Long, pink.
Crown Jewel	do	Medium ..	do ..	do ..	220	220	208	12	do do
Northern Spy	Strong	do	Large ..	do ..	216	216	200	16	Round, pink.
Rural Blush.....	do	Late ...	Medium ..	do ..	216	216	188	28	do do
Algoma No. 1.	Fair	Medium ..	Small ..	do ..	212	212	192	20	do do
Beauty of Hebron...	Strong	Early ..	Medium ..	do ..	208	208	188	20	Long, pink & white
Early Norther.....	do	Medium ..	Small ..	do ..	204	204	188	16	do do
Victor Rose	do	Late ...	Medium ..	do ..	200	200	184	16	Round, pink.
Early Sunrise.....	do	Medium ..	Small ..	do ..	196	196	184	12	Long, do
Early Ohio	Fair	Early ..	Medium ..	do ..	196	196	180	16	Round, do
Early Puritan.....	Strong.....	Early ..	Medium ..	do ..	196	196	184	12	Long, white.
Irish Daisy.....	Fair	Late ...	do ..	do ..	196	196	180	16	Round, do
Puritan.....	do	do	do ..	do ..	192	192	176	16	Long, do
Holborn Abundance.	Very strong.	do	do ..	do ..	192	192	172	20	Round, white.
Thorburn	Fair	Early ..	Small ..	do ..	188	188	168	20	do pink and white
Ideal.....	Very strong.	Late ...	Medium ..	do ..	188	188	180	8	Long, pink.
Prize Taker.....	do	do	do ..	do ..	184	184	144	40	Round, do
Daisy	Fair	Medium ..	do ..	do ..	184	184	172	12	Long, do
Dreer's Standard....	do	do	do ..	do ..	184	184	172	12	Round, white.
Vanguard	Weak	do	do ..	do ..	184	184	172	12	do pink.
Early Rose.....	Fair	Early ..	Small ..	do ..	180	180	160	20	Long, do
I. X. L.....	Strong.....	Late ...	Medium ..	do ..	176	176	152	24	do pink and white
Freeman's	Fair	Medium ..	do ..	do ..	176	176	164	12	Round, white.
American Wonder..	Very strong.	Late ...	do ..	do ..	176	176	152	24	Half long, do
Lee's Favourite.....	do	Early ..	do ..	do ..	176	176	160	16	Long, pink.
Seedling No. 214....	Fair	Medium ..	do ..	do ..	172	172	144	28	Round, white.
Burpee's Extra Early	Strong.....	do	do ..	do ..	168	168	152	16	Long, pink.
Wonder of the World	do	Early ..	do ..	do ..	164	164	140	24	do do
Clarke's Extra Early	Fair	do	do ..	do ..	164	164	152	12	do do
Stourbridge Glory...	Very strong.	Late ...	do ..	do ..	164	164	136	28	Round, white.
Late Puritan.....	Strong.....	do	do ..	do ..	160	160	152	8	Long, do
Pride of the Market.	do	do	do ..	do ..	160	160	144	16	Round, do
Maggie Murphy.....	Fair	Medium ..	do ..	do ..	160	160	152	8	do pink.
New Queen.....	do	do	do ..	do ..	152	152	144	8	Long, do
Early Sunrise.....	Strong.....	Late ...	do ..	do ..	152	152	144	8	do do
Brownell's Winner ..	do	do	do ..	do ..	152	152	140	12	Round, do
Early Six Weeks....	do	Early ..	do ..	do ..	148	148	128	20	do do
Orphans.....	Very strong.	Late ...	do ..	do ..	148	148	128	20	Long, white.
Money Maker.....	Fair	Medium ..	do ..	do ..	148	148	132	16	Round, do
Troy Seedling.....	Strong.....	Late ...	do ..	do ..	148	148	140	8	do do
Flay Rose.....	do	do	do ..	do ..	140	140	112	28	do pink.

POTATOES—Test of varieties—Continued.

Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Yield per Acre.				Form and Colour.
					Total.	Sound.	Mar- ketable.	Unmar- ketable.	
					Bush.	Bush.	Bush.	Bush.	
Lightning Express..	Fair	Medium	Medium	Good.	140	140	128	12	Long, white.
Harbinger	Strong.....	Early ..	do .	do .	140	140	128	12	do pink.
Peerless Junior.....	Fair	Late ...	do .	do .	136	136	112	24	Round, white.
Pride of the Table...	Strong.....	do ...	Small ..	do .	124	124	108	16	Long, pink & white
Great Divide.....	Fair	Medium	Medium	do .	108	108	100	8	do white.

EXPERIMENTS WITH ROOTS.

Notwithstanding the large amount of rain which fell early in the growing season, the average yield of roots was light. The soil on which they were sown was clay loam, and the size of the plots $\frac{1}{20}$ th acre each. All the varieties came up evenly, and after they were thinned out, they gave promise of a great crop. Shortly after this, however, they were attacked by flies and caterpillars, which injured the foliage and weakened the plants.

The following tables record the results of the tests with turnips, mangels, carrots and sugar beets :—

TURNIPS—Test of varieties.

Name of Variety.	Character of Growth.	1st Plot Sown.	1st Plot Pulled.	Yield per Acre.		Yield per Acre.		Yield per Acre.		Yield per Acre.		Color and Shape of Variety.
				1st Plot.	1st Plot.	1st Plot.	1st Plot.	2nd Plot.	2nd Plot.	2nd Plot.	2nd Plot.	
				Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.		
Purple Top Mammoth or Improved Greystone ...	Even...	May 25.	Oct. 4..	43	640	1444	..	29	1400	990	Uniform.	
Skirving's Swede.....	do ..	do 25.	do 4..	20	800	680	..	12	....	410	do oval.	
East Lothian.....	Uneven	do 25.	do 4..	18	1200	620	..	11	800	380	do do	
Hartley's Bronze	do .	do 25.	do 4..	17	1280	588	..	14	620	477	Long-necked.	
Imperial Swede.....	Even...	do 25.	do 4..	17	1040	584	..	12	1920	432	do	
Jumbo or Monarch.....	do ..	do 25.	do 4..	17	1040	584	..	12	....	400	do	
Rennie's Prize Purple Top..	do ..	do 25.	do 4..	17	560	576	..	12	1200	420	Uniform; oval.	
Lord Derby.....	Uneven	do 25.	do 4..	17	500	575	..	14	1280	488	Long-necked.	
Carter's Elephant.....	Even...	do 25.	do 4..	16	1600	560	..	11	1640	394	do	
Purple Top.....	Uneven	do 25.	do 4..	16	1120	552	..	15	....	500	Uniform; oval.	
Elephant's Master.....	do .	do 25.	do 4..	14	800	480	..	9	1200	320	Long-necked.	
Giant King	do .	do 25.	do 4..	13	160	436	..	10	820	347	Uniform.	
Champion Purple Top.....	do .	do 25.	do 4..	10	1120	352	..	9	1260	321	Long-necked.	

MANGELS—Test of varieties.

Mammoth Long Red-Webb	Even ..	May 25.	Sep. 25.	16	880	548	..	12	600	410	Red; uniform.
Golden Tankard	do ..	do 25.	do 25.	16	400	540	..	15	....	500	Golden do
Mammoth Long Red-Evans	do ..	do 25.	do 25.	13	160	436	..	12	560	426	Red do
Conqueror Yellow Globe...	do ..	do 25.	do 25.	12	1200	420	..	12	600	410	Yellow do
Red Fleshed Tankard.....	do ..	do 25.	do 25.	12	720	412	..	11	1940	399	Red do
Giant Yellow Intermediate.	do ..	do 25.	do 25.	12	680	411	20	12	....	400	Yellow; bad.
Mammoth Long Red.....	do ..	do 25.	do 25.	11	560	376	..	10	1300	355	Red; long tap root
Yellow Fleshed Tankard ..	do ..	do 25.	do 25.	11	520	375	20	11	500	375	Yellow; uniform.
Warden Prize Orange Globe	do ..	do 25.	do 25.	11	40	367	20	8	1940	299	Orange do
Mammoth Long Red-Sharpe	do ..	do 25.	do 25.	10	1360	356	..	9	480	308	Red; long tap root
Champion Yellow Globe...	do ..	do 25.	do 25.	10	680	344	40	10	400	340	Yellow; uniform.
Red Globe	do ..	do 25.	do 25.	9	1680	328	..	9	600	310	Red do
Gatepost	do ..	do 25.	do 25.	9	240	304	..	12	....	400	do do

CARROTS—Test of Varieties, one Seeding only.

Name of Variety.	Character of Growth.	1st Plot Sown.	1st Plot Pulled.	Yield per Acre.		Yield per Acre.	Colour and Shape of Variety.
				Tons.	Lbs.	Bush.	
Iverson's Champion.....	Strong.....	May 14	Oct. 16	9	1,200	320	White; uniform.
Giant Short White Vosges....	Fair	do 14	do 16	9	960	316	do do
White Belgian	Strong.....	do 14	do 16	8	1,760	296	do do
Yellow Intermediate	do	do 14	do 16	8	1,280	288	Yellow do
Scarlet do	do	do 14	do 16	8	1,280	288	Scarlet do
Long Orange.....	do	do 14	do 16	8	800	280	Orange do
Carter's Orange Giant.....	do	do 14	do 16	8	800	280	do long.
Improved Half Long	Fair	do 14	do 16	8	80	268	White; uniform.
do Short White	Strong.....	do 14	do 16	7	1,600	260	Green and white; short.
Short White	Fair	do 14	do 16	7	1,360	256	White; uniform.
Mammoth White Intermediate	do	do 14	do 16	7	400	240	do do
Early Gem.....	Strong.....	do 14	do 16	7	400	240	Scarlet do

SUGAR BEETS—Test of Varieties, one Seeding only.

German White.....	Strong.....	May 25	Oct. 16	14	320	472	
French White.....	do	do 25	do 16	13	400	440	
Klein Wanzleben.....	Very strong.	do 25	do 16	12	1,440	424	
Vilmorin's Improved	Strong.....	do 25	do 16	11	320	372	
Utah	do	do 25	do 16	9	1,200	320	
Austrian Electoral.	Very strong.	do 25	do 16	9	1,200	320	

VEGETABLE GARDEN.

Most vegetables were a good crop ; onions, cabbage, beets, cauliflower, celery, lettuce, and radish, were extra good ; cucumbers, melons, citrons, pumpkins, squash and tomatoes, however, on account of the cold nights, did not do so well.

Following are the names of varieties of all kinds of vegetables grown, with results of tests :—

Artichokes.—Sown 17th April ; made a top growth of about 4 feet, but tubers were small.

Asparagus.—Conover's Colossal—In use from 15th May to 15th July. An excellent crop ; good quality.

Donald's Elmira, Early Argenteuil, Mammoth White Columbus, Barr's Mammoth.—Sown 1894 ; made good growth, but were not old enough to cut this year.

BEETS—Test of varieties. All sown 29th April.

Name of Variety.	Up.	Fit for use.	Lifted.	Bushels per acre.	Shape.	Size.	Colour.	Remarks.
Eclipse.....	May 20	June 1	Sep. 26	1089	Round...	Very large	Clear light...	
Dreer's Half-long	" 20	" 15	" 26	1008	Half long	"	" red.....	
Rennie's Intermediate..	" 20	" 15	" 26	1008	"	"	Dark red.....	Best long cut.
Long Dark Red.....	" 20	" 15	" 26	847	Long....	Large ..	Clear red.....	
Columbia	" 20	" 15	" 26	806	Round...	"	Lightstreaked	
Arlington's Favourite..	" 20	" 1	" 26	685	"	"	Red "	
Edmund's Blood Turnip	" 20	" 1	" 26	564	" ..	Medium..	Dark red....	Best turnip variety.
Nonsuch	" 20	" 15	" 26	322	Half long	Small....	Very dark red	Best quality, but small.

BEANS—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for Use.	Remarks.
Broad Windsor.....	April 17..	May 25..	Aug. 1..	Good crop, well podded and filled.
<i>First Seeding.</i>				
Wardell's Kidney Wax.....	April 30..	May 10..	Aug. 4..	Good crop; well filled pods; the best
Crystal Wax.....	" 30..	" 10..	" 4..	Fair crop. [early bean.
Golden-eyed Wax.....	" 30..	" 10..	" 10..	Poor crop.
White Wax.....	" 30..	" 10..	" 4..	Poor crop.
Dwarf German Wax.....	" 30..	" 10..	" 6..	Fair crop.
Rennie's Rust-proof.....	" 30..	" 10..	" 4..	Fair crop, good quality.
<i>Second Seeding.</i>				
White Wax.....	May 7..	May 17..	Aug. 20..	Good crop.
Dwarf Mohawk.....	" 7..	" 17..	" 20..	Poor crop; not well filled.
Emperor William.....	" 7..	" 17..	" 25..	Very small crop.
Crystal Wax.....	" 7..	" 17..	" 15..	Small crop.
Dwarf Giant Wax.....	" 7..	" 17..	" 20..	Good crop.
Golden-eyed Wax.....	" 7..	" 17..	" 20..	Good crop.
Wardell's Kidney Wax.....	" 7..	" 17..	" 20..	Good crop—the best.
Giant White Runner.....	" 7..	" 17..	" ..	Too late; did not pod.
Early China.....	" 7..	" 17..	" 15..	Very good crop.

CELERY.—Test of Varieties.

Name of Variety.	Sown.	Transplanted in Hot-bed.	Transplanted to Garden.	Fit for Use.	Lifted.	Size.	Quality.	Colour.
Rennie's Giant White ..	Mar. 25	May 29	June 29	Aug. 25	Oct. 3	Very large..	Good...	White.
Paris Golden Yellow ..	do 25	do 29	do 29	do 25	do 3	Medium....	Extra ..	Yellow.
Evan's New Triumph..	do 25	do 29	do 29	do 25	do 3	Large	do ..	White.
DeCandolle.....	do 25	do 29	do 29	do 25	do 3	do	Coarse..	Went to seed.
Henderson's Golden Dwarf.....	do 25	do 29	do 29	do 25	do 3	do	Fair ...	White.
Vaughan's Giant Golden Heart.....	do 25	do 29	do 29	do 25	do 3	do	do ...	do
Pink Plume.....	do 25	do 29	do 29	do 25	do 3	Small	Extra ..	Pink.
White Plume.....	do 25	do 29	do 29	do 15	do 3	Medium....	do ..	White.
Giant Pascal.....	do 25	do 29	do 29	do 25	do 3	Large	Good...	do

TABLE CARROTS.—Test of Varieties.

Name of Variety.	Sown.	Up.	Fit for Use.	Lifted.	Bushels per acre.	Remarks.
Early Very Short.....	April 18	May 15	July 5	Oct. 8	625	Almost round ; coarse and badly split.
Henderson's Intermediate.	do 18	do 15	do 15	do 8	625	Good crop ; fair quality.
Half-long Scarlet Nantes.	do 18	do 15	do 15	do 8	605	Extra crop ; the best garden carrot.
Scarlet Intermediate stump-rooted.....	do 18	do 15	do 15	do 8	524	Good crop.
Early French Short-horn..	do 18	do 15	do 10	do 8	524	Good crop.
Half-long Scarlet Carentan.	do 18	do 15	do 15	do 8	363	Small but of good quality.

TABLE CORN.—Test of Varieties.

Name of Variety.	Sown.	Up.	Fit for Use.	Ripe.	Remarks.
Native	May 7	June 1	Sept. 1	Sept. 20	Small ears but fair crop.
Talbot's First and Best..	do 7	do 1	.....	.....	None fit for use ; did not come up till June.
Adam's Early.....	do 7	do 1	.....	.....	do do do
Burpee's First of All....	do 7	do 1	.....	.....	do do do
Mitchell's White Flint ..	do 16	May 20	Aug. 24	.....	Fair crop.
Mitchell's Extra Early ..	do 16	do 20	do 24	.....	do
Dreer's First of All.....	do 16	do 20	do 24	.....	do
Early Cory	do 16	do 20	Sept. 1	.....	do
Burpee's First of All....	do 16	do 20	do 1	.....	do
Extra Early Vermont...	do 16	do 20	do 1	.....	do

NOTE.—The six varieties sown on 16th of May were watered in the hills at time of seeding. Germinating quickly, they produced much better results than the same varieties sown 7th May. The corn did not ripen but was a fair crop for cooking.

CUCUMBERS.—Test of Varieties.

Name of Variety.	Sown.	Transplanted into Frame.	Fit for Use		Duration of Fitness for Use.	Size.	Remarks.
			From	Till	Months.		
Japanese Climbing ..	April 6	May 6	.....	.....	.....	.....	Of no value ; none formed.
Pride of Canada	do 6	do 6	July 12	Aug. 22	1½	Large	Very fine. Large fruit.
White Wonder.....	do 6	do 6	do 20	do 20	1	Small	Good crop.
Giant Pera	do 6	do 6	do 12	do 22	1½	do	Fair.
Giant White.....	do 6	do 6	do 10	do 20	1½	do	Poor.
Paris Pickling	do 6	do 6	Aug. 1	do 30	1	do	Not true to name.
Thoroughbred White Spine.....	do 6	do 6	July 20	do 20	1	do	Very poor.
Siberian	do 6	do 6	do 20	do 20	1	do	Poor.
White Wonder.....	do 6	do 6	do 12	do 22	1½	do	Good quality.

CITRONS.

Common.....	April 6	May 6	Sept. 10	} Fruit very small and poor crop on account of cold nights.
Colorado	do 6	do 6	do 10	

CABBAGE.—Test of Varieties. All sown in hot-bed, March 25.

Name of Variety.	Transplanted in Hot-bed.		Transplanted in Garden.		Fit for Use.		Taken Up.		Average Weight of Heads.	Remarks.
									Lbs.	
Large Late Drum- head	April	16	May	25	Sept.	10	Oct.	12	13	Extra—the best cabbage grown this year.
Lauderback's All the Year Round	do	16	do	25	do	15	do	12	8	Fair—hardhead—fair quality.
Early Winningstadt.	do	16	do	25	July	27	do	12	8	do do but small.
Burpee's All Head..	do	16	do	25	Aug.	5	do	12	16½	Extra—one of the best.
Drumhead Savoy ...	do	16	do	25	July	27	do	12	8	Fair—good small heads.
Large Red Drumhead	do	16	do	25	Sept.	20	do	12	10	Extra—the best red cabbage.
Autumn King.....	do	16	do	25	do	20	do	12	18	do good late cabbage.
Surehead.....	do	16	do	25	do	20	do	12	16½	Good—the best heads.
World Beater.....	do	16	do	27	Aug.	20	do	12	13	do large heads—medium quality.
Henderson's Summer	do	16	do	27	July	30	do	12	10½	do good early cabbage.
Vandergraw	do	16	do	27	Sept.	15	do	12	12	do large.
Nonsuch	do	16	do	27	Oct.	1	do	12	13½	do late.
Bruce's Winter	do	16	do	27	do	1	do	12	15	Extra—late.

CAULIFLOWER.—Test of Varieties.

Name of Variety.	Sown.	Up.		Transplanted in Hot-bed.	Transplanted in Garden.	Fit for Use		Duration of Fit- ness for Use.	Remarks.
						From	Till		
								Mos.	
Autumn King	Mar. 25	April 1	April 17	May 25	Sept. 15	Oct. 15	1	Very large, but almost too late.	
Bruce's Selected Erfurt	do 25	do 1	do 17	do 27	June 24	Aug. 25	2	Extra fine heads; good quality.	
Autumn Giant	do 25	do 1	do 17	do 25	Sept. 15	Oct. 15	1	Very large, but late.	
Earliest Dwarf Erfurt	do 25	do 1	do 17	do 25	July 1	Aug. 1	1	Very good.	
Gilt Edge	do 25	do 1	do 17	do 25	June 24	July 14	2½	Good quality, but small heads.	
Giant White Pearl..	do 25	do 1	do 17	do 25	July 1	Aug. 15	1½	Extra fine; one of the best.	
King of the Earliest.	do 31	do 4	do 17	do 27	do 1	do 15	1½	Good quality, bu small heads.	
Early Whitehead ...	do 31	do 4	do 17	do 27	June 24	do 24	2	Extra fine; one of the best.	
Early Favourite.....	do 31	do 4	do 17	do 27	July 1	do 20	1½	Fair.	

LETTUCE—Test of varieties.

Name of Variety.	Sown.	Trans- planted in hot-bed.	Fit for use.	Remarks.
<i>Sown in Hot-bed.</i>				
Simpson's Early Curled.....	Mar. 28..	May 1..	May 25..	Fair size.
Gardener's Favourite.....	" 28..	" 1..	" 25..	Large, loose heads ; good.
Denver Market.....	" 28..	" 1..	" 25..	Large heads ; very good.
<i>Sown in Garden.</i>				
Bruce s Nonpareil.....	April 29..		June 1..	Very good.
Gardener's Favourite.....	" 29..		" 1..	"
Denver Market.....	" 29..		" 1..	"
The Deacon.....	" 29..		" 1..	One of the best.
Grand Rapids ..	" 29..		" 1..	Extra good ; curly.
Defiance.....	" 29..		" 1..	"
Big Boston.....	" 29..		" 1..	Very large, solid heads.
New Cos.....	" 29..		" 1..	Fair.
Golden Queen.....	" 29..		" 1..	Extra fine ; small, hard heads.
Toronto Queen.....	" 29..		" 1..	Very good.
The last-mentioned ten varieties were again sown on.....	June 11..		July 10..	All varieties produced a large crop of excellent quality and kept in condi- tion for use till first severe frost.

MELONS—Test of varieties.

Name of Variety.	Sown.	Trans- planted.	Remarks.
MUSK.			
Our own seed.....	April 6..	May 6..	} A failure on account of cold nights.
Evan's Superb	" 6..	" 6..	
Newport.....	" 6..	" 6..	
WATER.			
Phinney's Early.....	" 6..	" 6..	} Only two melons formed, and these did not ripen.
Early Canada.....	" 6..	" 6..	

PARSNIPS—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Bushels per acre.	Remarks.
Hollow Crown.....	April 18..	May 15..	Sept. 1..	443	Good quality and shape.
Maltese	" 18..	" 15..	" 1..	705	Large crop ; extra quality and shape.

KALE—Test of varieties.

Name of Variety.	Sown.	Up.	Trans- planted in hot-bed.	Trans- planted in garden.	Fit for use.	Lifted.	Remarks.
Tall Green.....	Mar. 25...	April 2...	April 16..	May 27..	Oct. 1...	Oct. 12..	Very fine.
Plumage.....	" 25...	" 2...	" 16..	" 27..	" 1...	" 12..	"

ONIONS—Test of varieties.

Name of Variety.	Sown in hot-bed.	Up.	Trans- planted to garden.	Fit for use.	Lifted.	Bushels per acre.	Remarks.
<i>Transplanted.</i>							
Prize Taker.....	Mar. 25	April 5	May 27	July 1	Sept. 25	625	Extra fine crop; good onions. Quality, the best.
" (our own seed)	" 25	" 5	" 27	" 1	" 25	625	Extra fine crop; good onions.
Red Victoria.....	" 25	" 5	" 27	" 1	" 25	605	Extra fine crop; good onions. Quality: very good; even.
Blood Red Wethersfield	" 25	" 5	" 27	" 1	" 25	605	Extra fine crop; good onions.
Worldbeater "	" 25	" 5	" 27	" 1	Oct. 1	564	" "
Early Red (our own seed).....	" 25	" 5	" 27	" 1	" 1	524	" "
Yellow Globe Danvers.	" 25	" 5	" 27	" 1	" 1	504	" "
Giant Rocca.....	" 25	" 5	" 27	" 1	Sept. 25	484	" "
Yellow Danvers.....	" 25	" 5	" 27	" 1	Oct. 1	484	" "
Fancy Yellow Danvers	" 25	" 5	" 27	" 1	" 1	484	" "
Oregon.....	" 25	" 5	" 27	" 1	" 1	484	" "
Red Wethersfield.....	" 25	" 5	" 27	" 1	" 1	443	" "
Southport White Globe	" 25	" 5	" 27	" 1	Sept. 25	403	" "
Large Red Globe.....	" 25	" 5	" 27	" 1	Oct. 1	403	" "
Large Red Globe (our own seed).....	" 25	" 5	" 27	" 1	" 1	403	" "
Oxonian Prize.....	April 5	" 15	" 27	Aug. 1	" 1	322	Very small but firm.
Ailsa Craig	" 5	" 15	" 27	" 1	" 1	322	"

ONIONS—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Lifted.	Bushels per Acre.	Remarks.
<i>Sown in Open Ground.</i>						
Red Globe.....	April 18	May 6	July 10	Oct. 1	524	Good crop of fine onions. Quality, very fine.
Salzer's King of Earlies....	" 18	" 6	" 10	" 1	443	Good crop of fine onions.
Early Red (our own seed).	" 18	" 6	" 10	" 1	443	" "
Red Globe "	" 18	" 6	" 10	" 1	423	" "
Yellow Danvers "	" 18	" 6	" 10	" 1	423	" "
Red Wethersfield.....	" 18	" 6	" 10	" 1	423	" "
Yellow Danvers.....	" 18	" 6	" 10	" 1	423	" " Quality,
Prize Taker	" 18	" 6	" 10	" 1	403	the best.
Prize Taker (our own seed).	" 18	" 6	" 10	" 1	403	Good crop of fine onions.
Southport White Globe,...	" 18	" 6	" 10	" 1	363	" "
Small Silver Skin.....	" 18	" 6	" 10	Aug. 21	201	" " Quality,
New Queen.....	" 18	" 6	" 10	" 21	181	good pickler. Good crop of fine onions. Quality, the best pickler.

GARDEN PEASE—Test of Varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Pulled.	Remarks.
<i>1st Seeding.</i>					
Rennie's Extra Early	April 17	May 1	July 9	.....	Very early ; heavy crop ; small pease.
Alaska	" 17	" 1	" 9	.....	" "
American Wonder	" 17	" 1	" 12	.....	Good early pea.
Horsford's Market Garden.....	" 17	" 1	" 29	.....	Good quality ; large cropper.
Wm. Hurst	" 17	" 1	" 29	.....	Early ; good cropper ; quality good.
Burpee's Profusion.....	" 17	" 1	" 29	.....	Good quality.
Nott's Excelsior.....	" 17	" 1	" 29	.....	Fair cropper.
Shropshire Hero	" 17	" 1	Aug. 1	.....	The best quality.
Anticipation.....	" 17	" 1	" 4	.....	Large pods ; good quality ; late.
C. P. R.....	" 17	" 1	" 6	.....	" "
Prince of Wales.....	" 17	" 4	" 4	.....	" "
Juno.....	" 17	" 4	" 4	.....	" "
Stratagem	" 17	" 1	" 1	.....	Very good cropper ; fine quality.
<i>2nd Seeding.</i>					
American Wonder	May 7	May 17	Aug. 4	Sept. 1	Very good.
Alaska	" 7	" 17	" 4	" 1	"
Rennie's Extra Early.....	" 7	" 17	" 6	" 1	"
New Victoria.....	" 7	" 17	" 25	Not ripe	Very fine ; large pods, but late.
Stratagem	" 7	" 17	" 20	Sept. 1	"
Wm. Hurst	" 7	" 17	" 6	" 1	" dwarf pea.
Anticipation.....	" 7	" 17	" 20	Not ripe	Very good ; large pods, but late.
Shropshire Hero	" 7	" 17	" 20	Sept. 1	"
C. P. R	" 7	" 17	" 20	" 1	"
Yorkshire Hero.....	" 7	" 17	" 18	" 1	"

PARSLEY.

Name of Variety.	Sown.	Up.	Fit for use.	Remarks.
Moss Curled.....	April 18..	May 15..	June 15..	Good crop.

RADISH—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Remarks.
<i>Sown in Hot-bed.</i>				
In and Out.....	Mar. 28..	Apr. 3..	Apr. 22..	Most even and best of the four.
Lily White.....	" 28..	" 3..	" 22..	Good
Rosy Gem	" 28..	" 3..	" 22..	do
Scarlet Globe.....	" 28..	" 3..	" 25..	do
<i>1st Seeding in Garden.</i>				
Scarlet Globe.....	May 22..	May 28..	June 28..	Good.
Rosy Gem.....	" 22..	" 28..	" 28..	do
Rennie's White Tipped.....	" 22..	" 28..	" 28..	do
New Pearl.....	" 22..	" 28..	July 1..	Extra fine, long white, fit for use longer than others.
French Breakfast.....	" 22..	" 28..	June 28..	Good.
New White Lady Finger.....	" 22..	" 28..	July 1..	Extra fine, long white.
<i>2nd Seeding in Garden.</i>				
French Breakfast.....	June 11..	June 15..	July 10..	Good.
Lily White.....	" 11..	" 15..	" 12..	do
Rosy Gem.....	" 11..	" 15..	" 10..	do
New White Lady Finger.....	" 11..	" 15..	" 20..	Very fine, long white.
Scarlet Globe.....	" 11..	" 15..	" 10..	Good, longest in use of any of the Turnip varieties.
Rennie's White Tipped.....	" 11..	" 15..	" 10..	Good.
White Pearl.....	" 11..	" 15..	" 20..	The best long white.
White Turnip.....	" 11..	" 15..	" 12..	Good.
In and out.....	" 11..	" 15..	" 10..	One of the best.
<i>3rd Seeding in Garden.</i>				
Rennie's White Tipped.....	July 2..	July 8..	Aug. 2..	} All did well. No perceptible difference.
French Breakfast.....	" 2..	" 8..	" 2..	
New Rosy Gem.....	" 2..	" 8..	" 2..	
Lily White Turnip.....	" 2..	" 8..	" 2..	
In and Out.....	" 2..	" 8..	" 2..	

SPINACH.

Name of Variety.	Sown.	Remarks.
Victoria.....	Apr. 18..	Frozen down.
" (Re-sown)	May 22..	Did well, made good growth but ran to seed very quickly.

SQUASH, (under glass)—Test of varieties.

Yellow Mammoth... ..	May 14..	Two set and made 18 and 20 lbs. respectively.
Faxon.....	" 14..	None set.
Crookneck.....	" 14..	Two set, did not grow.
White Scallop.....	" 14..	Very small.
Yellow Scallop.....	" 14..	None set.
Eng. Vegetable Marrow.....	" 14..	A few good marrows.
Long White Bush Marrow.....	" 14..	Fair crop, some fit for use August 1st.
Bush Marrow.....	" 14..	Very few set, small.

Tomatoes.—Nine varieties were sown, but none ripened.
Pumpkins.—Three varieties were sown, but none ripened.

RHUBARB.

Name of Variety.	In Use		Remarks.
	From	Till	
Victoria.....	May 1.	Sep. 1.	Fine large stalks.
Linnaeus.....	do 1.	do 1.	do do do
Stott's Mammoth ..	do 10.	do 1.	Very large.

Kohl-rabi.—Sown in hotbed, March 25. Transplanted, May 25. Yield, 510 bushels per acre.
Sage.—Sown April 18. Good crop.

TABLE TURNIPS.—Test of Varieties.

Name of Variety.	Sown.	Yield per acre.
		Bush.
1st Seeding.—		
Early White Stone.....	June 14....	806
Golden Ball.....	do 14....	403
2nd Seeding.—		
Early White Stone.....	do 18....	594
Golden Ball.....	do 18....	418

FLOWER GARDEN.

The flower garden the past year was the finest we have ever had, not only in variety, but in length of time the flowers were in bloom, and in richness of colour.
Stocks, phlox, mignonette, asters, dianthus, petunias, pansies, and sweet pease were especially fine.
Following are varieties grown :—

ANNUALS.

Name of Variety.	Sown.	Transplanted.		In Flower.		Remarks.
		Hot-bed.	Garden.	From.	Till.	
Petunias, five varieties..	Mar. 30..	May 1..	June 6..	July 1..	Frozen...	All extra fine ; one of the first flowers in bloom, and made a good show all season.
Pyrethrum, Golden.....	do 30..	do 1..	do 6..	.....	.....	Made a good edging for beds.
Phlox Drummondii, four varieties.....	do 30..	do 1..	do 6..	July 15..	Frozen...	Very fine ; all did well.

ANNUALS—Continued.

Name of Variety.	Sown.	Transplanted.		In Flower.		Remarks.
		Hot-bed.	Garden.	From.	Till	
<i>Marigolds—</i>						
African.....	April 12..	May 6..	June 6..	.....	.....	Very fine; showy.
French.....	do 12..	do 6..	do 6..	.....	.....	Showy.
Salpiglossis.....	Mar. 30..	do 1..	do 7..	.....	.....	Extra fine; in flower all season.
Abronia umbellata.....	do 30..	April 24..	do 4..	July 15..	Frozen...	Fine.
Anagallis.....	do 30..	do 24..	do 4..	do 10..	do ...	do
Anterrhinum Majus.....	do 30..	do 24..	do 5..	do 10..	do ...	Very fine.
<i>Asters—</i>						
Double Dwarf Chrysanthemum Flowered.	do 30..	do 24..	do 5..	do 20..	do ...	Fine.
Snowball..	do 30..	do 24..	do 5..	do 10..	do ...	do
Dwarf Cream Crimson	do 30..	do 24..	do 5..	do 10..	do ...	Extra fine.
New Triumph ..	do 30..	do 24..	do 5..	do 10..	do ...	do
Harlequin.....	do 30..	do 24..	do 5..	do 20..	do ...	Poor.
Pæony Flowered.....	do 30..	do 24..	do 5..	do 20..	do ...	Fine.
Vick's New Branched.	do 30..	do 24..	do 5..	do 20..	do ...	do
Balsam, Camelia Flower.	do 30..	do 24..	do 5..	.....	.....	Did not do well; too tender to stand winds.
Carnation, Marguerite ..	do 30..	do 24..	do 5..	Aug. 20..	Frozen...	Fine.
Calendula	do 30..	do 24..	do 5..	July 20..	do ...	Very fine show.
Calendrina Grandiflora..	do 30..	do 24..	do 5..	Aug. 1..	Sept. 1..	Fair.
Ice Plant.....	do 30..	May 1..	do 7..	.....	.....	Very pretty.
<i>Everlastings.</i>						
Helichrysum.....	do 30..	April 24..	do 7..	July 1..	.....	Did well; flowered freely all season.
Xeranthemum.....	do 30..	do 24..	do 7..	do 1..	.....	do do
Acroclinium.....	do 30..	do 24..	do 7..	do 1..	.....	do do
Helipterum.....	do 30..	do 24..	do 7..	do 1..	.....	do do
<i>Linum—Grandiflorum.</i>						
Scarlet and Rose.....	April 6..	May 1..	do 7..	All season	.....	Both very fine.
<i>Godetia—</i>						
Mixed (from Ex. F. Agassiz)	Mar. 30..	do 1..	do 7..	do	.....	} Did well, and made one of the most showy beds in the garden.
Queen of Fairies.....	do 30..	do 1..	do 7..	do	.....
Lady Satin Rose	do 30..	do 1..	do 7..	do	.....
Scabiosa.....	do 30..	do 1..	do 7..	do	.....	Extra fine.
Clarkia Elegans.....	Mar. 30..	April 24..	do 5..	Aug. 1..	Sept. 1..	Fine.
Chrysanthemum Dunetti	do 30..	do 24..	do 5..	do 1..	do 1..	Coarse but showy.
Agrostemma	April 6..	do 24..	do 6..	July 1..	do 1..	Very showy; did well.
Calliopsis.	do 6..	do 24..	do 6..	do 7..	Frozen ...	Very fine and showy.
Datura Cornucopia.....	do 12..	May 1..	do 10..	.....	.....	Too tender for this climate.
Dianthus, five varieties..	Mar. 30..	April 24..	do 7..	July 1..	Frozen ...	All did well and flowered freely.
Gaillardia Picta.....	April 6..	May 1..	do 7..	do 1..	do ...	Very fine.
Gilia Tricolor.....	do 6..	do 1..	do 7..	do 1..	do ...	Good for sowing in clumps.
Verbena Hybrida.....	Mar. 30..	do 10..	do 7..	.....	.....	Very fine; one of our est flowers.
do Mammoth ...	do 30..	do 10..	do 7..	.....	.....	Extra fine; one of our best flowers.

ANNUALS—Concluded.

Name of Variety.	Sown.	Transplanted.				In Flower.		Remarks.
		Hot-bed.		Garden.	From	Till		
<i>Pansies—</i>								
Premium.....	Mar. 29..	May 1..	do 1..	do 1..	.....	Frozen ...	Very fine.
From Ex. F. Agassiz..	.....	do 1..	do 1..	do 1..	.....	do ...	do
Choice, from Ewing...	April 5..	do 1..	do 1..	do 1..	.....	do ...	Extra fine.
Yellow, Black Eye....	do 5..	do 1..	do 1..	do 1..	.....	do ...	Small but true to name.
Henderson's M a m .								
Butterfly	do 6..	do 1..	do 1..	do 1..	.....	do ...	do do
Giant Trimardeau... ..	do 6..	do 1..	do 1..	do 1..	.....	do ...	Extra fine, large flowers.
Tagetes.. ..	do 12..	do 6..	do 6..	do 6..	.....	.....	No good.
Mirabilis Jalapa.....	do 12..	do 6..	do 6..	do 6..	.....	.....	Did not do well.
Viscaria.....	do 12..	do 6..	do 6..	do 6..	.....	.....	Fair for sowing in clumps
<i>Stocks—</i>								
Double Dwarf German,								
10 weeks.....	Mar. 30..	do 1..	do 1..	do 7..	.....	.....	Very fine
German 10 weeks	do 30..	do 1..	do 1..	do 7..	.....	.....	do
Henderson's Colossal..	April 12..	do 1..	do 1..	do 7..	.....	.....	Extra fine
Double Large Flower-								
ing	do 12..	do 1..	do 1..	do 7..	.....	.....	do
Dwarf Bouquet.....	do 12..	do 1..	do 1..	do 7..	.....	.....	do
Zinnia Elegans.....	do 10..	do 12..	do 12..	do 7..	.....	.....	Extra fine.

ANNUALS—SOWN IN OPEN GROUND.

Phlox Drummondii.—Sown 12th May ; very good. Equal to plants from hot-bed.
Schizanthus.—Sown 12th May ; very showy.
Sweet Alyssum.—Sown 12th May ; extra fine for borders. Flowered all season.
Candytuft.—Sown 12th May ; very fine. Flowered all season.
Mignonette.—Sown 12th May ; very fine.
Scarlet Flax.—Sown 12th May ; very fine. Better than plants from hot-bed.
Poppy.—Sown 12th May ; very showy.
Eschscholtzia.—Sown 12th May ; one of the best annuals.
Mallow.—Sown 12th May ; one of the best annuals.
Whitlavia.—Sown 12th May ; good border plant.
Lavatera.—Sown 12th May ; very showy and hardy.
Viscaria.—Sown 12th May ; very good but tender.
Nasturtium.—Sown 12th May ; very good but tender.
Sweet Peas.—Sown 12th May ; good show. Did well, but no seed ripened.

PERENNIALS.

Yellow Flax.—Very fine yellow flower.
Larkspur.—One of the best perennials.
Veronica.—Very showy.
Scarlet Lychnis.—Very showy.
Sweet William.—Very hardy. One of the best perennials.
Phlox Perennial.—Very fine.
Iceland Poppy.—Very showy and hardy.
Pæony.—Hardy. Flowered.
Clematis Flammula.—Growth four feet.
Hibiscus.—Growth three feet. Buds killed by frost.
Common Flowering Flax.—Did well. Excellent for borders.

FRUIT BUSHES.

The wild fruit crop was almost a complete failure in many portions of the Territories, the past season. Heavy frosts in May caught the bushes when in full blossom, and destroyed the crop.

Cultivated fruits on this farm suffered greatly from the same cause. In currants, black, red and white, about three-quarters of the blossoms were killed, the raspberries were nearly all destroyed, and very few gooseberries and strawberries escaped. Sand cherries and Manitoba plums were in full bloom when the frost came, and all were destroyed.

Some additions were made the past season to the fruit plantations on the farm. Eighty-one plum trees from Stonewall, Manitoba, and twenty-two seedling wild plums grown from seed planted on the farm were set out in an orchard. These trees were planted seven feet apart each way.

The plantation put out in the spring of 1894, with seedlings of the Weaver plum, is doing well. Eighty trees were planted, and 73 are now alive and making a vigorous growth.

One tree of Buffalo-berry (*Shepherdia argentea*) produced a nice crop of fruit this season.

FOREST TREES.

The past season was a favourable one for forest trees. Although all sorts suffered a set back in May from frosts, they speedily recovered and made a strong growth, aided by the large amount of rain which fell during June and July. The new growth hardened well before winter set in, and the trees are in good condition to stand cold weather.

In the spring, Manitoba maple (box elder) trees were planted on each side of the road running north and south through the centre of the farm for three-quarters of a mile and two cross avenues of one-quarter mile each in length, were set out with Russian poplar. Manitoba maple trees were also planted on one-half mile of south boundary of farm. Dead trees were removed from existing avenues and replaced. With very few exceptions, all trees are living now and have made a very satisfactory growth.

With a view of ascertaining the cost of planting out forest trees and the amount of work necessary to keep them clean and in a thrifty condition, until they are able to do without further work, plantations were set out the past spring as follows:—

$\frac{1}{2}$ acre of Manitoba maple trees, $2\frac{1}{2}$ feet apart each way.

“ “ 3 feet “

“ “ $3\frac{1}{2}$ feet “

“ “ 4 feet “

$\frac{1}{2}$ acre of ash trees $2\frac{1}{2}$ “

$\frac{1}{2}$ acre each of Man. maple and ash seed was sown. The land, which had produced a crop of corn the preceding year, was deeply ploughed and well harrowed before the trees were planted. The Manitoba maple trees used were 1 year seedlings and the ash were 3 years old.

The method followed in taking up and replanting the trees was as follows:—One deep furrow was ploughed alongside the young trees, and the long roots cut by a second furrow, which enabled the men following to gather the trees in armfuls without any difficulty. The roots are carefully protected from sun and wind by being covered with damp earth as soon as they are taken up, and when required for planting are taken out in a tub half filled with thin mud.

In planting, a furrow is made with the plough going twice in same place as deeply as possible, and the furrows as far apart as necessary. One, two or three men, according to the length of the furrow, follow, as soon as the furrow is made, and plant the trees by placing the roots in the bottom of the furrow and drawing the earth from both sides with the feet, and tramping it well.

The long tap root on young maples is cut off before the trees are planted. The armful carried by men is first dipped in water and then well sprinkled with dry earth to protect the roots from sun and winds while they are being set out. As soon after planting as possible, the furrows are filled in by a plough, and the planting is finished.

Following is amount of labour which has been required the first year in connection with the above mentioned plantations:—

No. 1.

One-half acre maples planted $2\frac{1}{2}$ feet apart each way—

Planting trees—1 team and 3 men.....	5 hours.
Scruffling—1 horse and 1 man.....	$3\frac{1}{2}$ do.
Hoeing—2 men.....	$4\frac{1}{2}$ do.

No. 2.

One-half acre maples planted 3 feet apart each way.

Planting trees—1 team and 3 men.....	4 hours.
Scruffling—1 horse and 1 man.....	3 do.
Hoeing—2 men.....	6 do.

No. 3.

One-half acre maples planted $3\frac{1}{2}$ feet apart each way.

Planting trees—1 team and 3 men.....	3 hours.
Scruffling—1 horse and 1 man.....	3 hrs. 5 min.
Hoeing—2 men.....	4 do 10 do.

No. 4.

One-half acre maples planted 4 feet apart each way.

Planting trees—1 team and 3 men.....	3 hrs. min.
Scruffling—1 horse and 1 man.....	2 do 45.
Hoeing—2 men.....	3 do 30.

No. 5.

One-half acre ash planted $2\frac{1}{2}$ feet apart each way.

Planting trees—1 team and 3 men.....	6 hours.
Scruffling—1 horse and man.....	2 hrs. 55 min.
Hoeing—4 men.....	2 do.

No. 6.

Sowing $\frac{1}{2}$ acre ash seed, rows 3 feet apart, and keeping clean first season.

Marking out—1 team and man.....	2 hours.
Sowing seed—2 men.....	2 do.
Covering—2 men.....	3 do.
Scruffling—1 horse and 1 man.....	$1\frac{1}{2}$ do.
Hoeing—2 men.....	5 do.

No. 7.

Sowing $\frac{1}{2}$ acre maple seed, rows 3 feet apart, and keeping clean first season.

Marking out—1 team and man.....	2 hours.
Sowing seed—2 men.....	2 do
Covering—2 men.....	3 do
Scruffling—1 horse and 1 man.....	$1\frac{1}{2}$ do
Hoeing—4 men.....	$2\frac{1}{4}$ do

Labour, digging trees for five half-acre plots set out—1 team and 3 men for $7\frac{1}{2}$ hours.

SHRUBS.

The following is a list of shrubs planted in the spring of 1894 and those living this fall :—

Thirty-five varieties of lilac were planted but only two varieties survived, viz. : the common white and common purple. These were on their own roots, while the other varieties were grafted on what appeared to be a species of privet. The loss of these shrubs in this instance was probably due to the tenderness of the stock.

Name of Variety.	No. Planted	No. Living.	No. Dead.	Name of Variety.	No. Planted	No. Living.	No. Dead.
Cornus elegantissima.....	2	....	2	Prunus Maackii.....	2	2	
Exochorda Grandiflora.....	1	....	1	Lonicera splendens.....	2	2	
Weigelia lonerii.....	1	....	1	Improved Elderberry.....	2	2	
do candida.....	1	....	1	Hypericum Kalmianum.....	2	....	2
do Hendersonii.....	1	....	1	Betula Dahurica.....	2	1	1
do rosea nana var.....	1	....	1	Pyrus spuria.....	2	2	
Almond Double rose.....	2	....	2	Prunus Grayana maxima.....	2	2	
do white rose.....	2	....	2	Cotoneaster vulgaris.....	3	2	1
Persian Yellow rose.....	2	1	1	Caragana Redowsky.....	11	2	9
Hardy Hibiscus Common.....	1	....	1	do pygmæa.....	12	....	12
Elæagnus longipes.....	12	....	12	Berberis sinensis.....	2	2	
Elæagnus macrophylla.....	2	2		Spiræa rotundifolia.....	3	3	
Berberis cerasua.....	2	2		Rosa rubrifolia livida.....	7	7	
do laciflora ..	2	2		Lonicera chrysantha.....	5	....	5
do Fischeri.....	2	2		Viburnum rugosum.....	2	....	2
do macrophylla.....	2	2		Crataegus Sanguinea schroderi.....	13	10	3
Russian Snowball.....	4	4		Ligustrum Amurense... ..	25	13	12
Lonicera media.....	2	2		Rosa rugosa.....	21	17	4
do Germanica.....	2	2		Spiræa opulifolia.....	7	5	2
do Vor 133.....	3	....	3	Acer Ginnala.....	15	14	1
Russian Euonymus.....	2	2			262	111	151

ARBORETUM.

An arboretum was commenced the past spring, in which two specimens of all the varieties of trees and shrubs hardy enough to stand the climate of this country, will be grown.

The following were planted as a start and will be added to each spring as trees and shrubs prove hardy.

- Acer Ginnala Ginnalian maple.
- Artemisia Abrotanum Southernwood.
- “ “ Tobolskianum. Russian artemisia.
- Betula alba. European white birch.
- Caragana arborescens. Siberian pea-tree.
- “ frutescens.
- “ Redowsky. Redowsky’s caragana.
- Elæagnus argentea. Silvery elæagnus.
- “ angustifolia. Russian olive.
- Fraxinus pubescens. Red ash.
- “ sambucifolia. Black ash.
- “ viridis. Green ash.
- Juniperus virginiana. Red cedar.
- Negundo aceroides. Box elder.
- Picea alba. White spruce.
- “ excelsa. Norway spruce.
- “ pungens. Rocky Mountain blue spruce.

Pinus Mughus. Mountain pine.
 " *sylvestris*. Scotch pine.
 " " *rigaensis*. Riga pine.
Populus alba. White poplar.
 " *balsamifera*. Balsam poplar.
 " *bereolensis*.
 " *monilifera*. Cottonwood.
 " *Sibirica*. Siberian poplar.
 " *Wobstii*. Riga.
Prunus Pennsylvanica. Pin cherry.
 " *serotina*. Choke cherry.
Pesudotsuga Douglassi. Douglas' spruce.
Quercus macrocarpa. Burr oak.
Salix acutifolia. Sharp leaved willow.
 " *voronesh*. Voronesh willow.
Shepherdia argentea. Buffalo berry.
Spiraea opulifolia. Guelder rose leaved spiræa.
Symphoricarpus racemosus. Snowberry.
Syringa vulgaris alba. White lilac.
 " *chinensis rothamagensis*. Chinese lilac.
 " *Josikæa*. Josika's lilac.
Thuja occidentalis. Common arbor-vitæ.
Ulmus Americana. White elm.
Viburnum opulus. High bush cranberry.

HEDGES.

Fifteen varieties of trees, and shrubs, were planted out in hedges the past spring, viz. :

Negundo aceroides, Box elder ;
Fraxinus viridis, Green ash ;
Populus balsamifera, Balsam poplar ;
Salix acutifolia, Sharp leaved willow ;
Populus monilifera, Cottonwood ;
Caragana arborescens, Siberian pea-tree ;
Spiraea opulifolia, Guelder rose leaved spiræa ;
Elæagnus angustifolia, Russian olive ;
Acer Ginnala, Ginnalian maple ;
Artemisia Abrotanum v. Tobolskianum, Russian artemisia ;
Elæagnus argentea, Silvery elæagnus ;
Symphoricarpus racemosus, Snowberry ;
Cratægus crusgalli, Cockspur thorn ;
Amelanchier alnifolia, Saskatoon ;
Prunus pennsylvanica, Pin cherry.

All made a good start. The plants were small, and were set out about 15 inches apart in the rows. The hedges are 50 feet long and 9 feet apart. The object of this test was to find out what are the best trees or shrubs to use for this purpose for the North-west Territories. Other varieties will be added next spring.

LIVE STOCK.

Cattle.—The cattle on the farm are in a healthy and thriving condition. No losses have taken place since my last report, and since then six pure-breds have been added to the herd by births.

No feeding tests were conducted last winter on account of the general scarcity of feed.

Swine.—Since my last report, one Berkshire and two young Tamworth sows have been received from Ontario. The Berkshire sow from Snell Bros., Edmonton, one Tamworth from Central Experimental Farm, and one from John Bell, Amber, Ont.

Feeding tests with the various breeds are being carried on at present, the result of which will be given in the report for 1896.

POULTRY.

Very great success cannot be reported in poultry raising during the past year. Four breeds, Plymouth Rocks, Houdans, Light Brahmas and White Leghorns were kept over last winter, but two of these, the Houdans and Light Brahmas, having done very poorly the year previous, were discarded and White Wyandottes and Black Minorcas substituted this spring.

The birds now in stock are 12 Plymouth Rocks, 26 Black Minorcas, 17 White Wyandottes and 17 White Leghorns. These will be sufficient to make up good pens in the coming spring and better success is then anticipated.

Ten sittings were sent to applicants. Two hundred eggs were set and from them 82 chickens were hatched and 60 raised.

STALLION.

The stallion "Gallant Modele," from the Haras National Co., Montreal, was on the farm from May 11th to August 11 and served 21 mares during that time.

DISTRIBUTION OF SAMPLES OF GRAIN, POTATOES, FOREST TREES, &c.

During the months of March, April and May the following distribution was made of products all of which, with the exception of the tree seeds, were grown on the Experimental Farm.

Samples Distributed.	Number.	Total Number.
Grain—		
Wheat, 3 lb. bags.....	186	
Barley, 3 lb. bags.....	165	
Oats, 3 lb. bags.....	244	
Rye, 3 lb. bags.....	38	
Pease, 3 lb. bags.....	164	
		797
Forest Trees—		
Manitoba Maple, (box elder).....	4,762	
White Elm.....	90	
Green Ash.....	75	
Willows.....	550	
Poplars.....	50	
Cottonwoods.....	155	
Artemisia Abrotanum, Tobolsk. (cuttings).....	11,125	
Caragana arborescens (seedlings).....	2,450	
Lilacs.....	70	
Evergreens.....	23	
		19,350
Small Fruits—		
Raspberries.....		3,550
Currants.....		3,800
Tree Seeds—Maple, 1 lb. bags.....	360	360
Bromus Inermis Grass, 1 lb. bags.....	335	335
Potatoes—Var. Sorts, 3 lb. bags.....	340	340
Canary Seed—Small pkgs.....	150	150
Asparagus Roots.....	1,950	1,950
Rhubarb Roots.....	198	198
Flower Seeds—Pkgs.....	107	107
Vegetable Seeds—Collections in bags.....	129	129

SUMMARY OF DISTRIBUTION.

Samples Distributed.	Packages.	Bags.	Seedlings, Roots or Cuttings
Grain.....		797	
Grass Seed.....	150	335	
Potatoes.....		340	
Forest Trees and Artemisia Cuttings.....			19,350
Small Fruits.....			7,350
Vegetable Roots.....			2,148
Tree Seeds.....		360	
Vegetable Seeds—Collections.....		129	
Flower Seeds.....	107		
Totals.....	257	1,961	28,848

The demand for samples of all kinds was largely in excess of the supply available for distribution.

Alberta sent in fully 60 per cent of the applications received, a large number of which were from the new settlements on the Calgary and Edmonton Branch Railway.

REPORTS received from Samples distributed, 1894.

WHEAT.

Variety.	Reports received.	Results—3 lbs. sown.
Gehun.....	2	Did well, Assiniboia and Alberta.
Johnston's.....	1	M. Dubois, Duck Lake, 40 lbs. from 3 lbs.
Pringle's Champlain.....	3	Average from 3 lbs.—22 lbs.
Colorado.....	1	Good yield and sample, Alberta.
Ladoga.....	1	Destroyed by gophers.
Great Western.....	1	Failure from drought, Alberta.
Stanley.....	1	H. W. Thompson, Moosomin, reports 8 days earlier than Red Fife.
Black Sea.....	1	R. McKernan, Edmonton, reports 10 days earlier than Red Fife.
Australian.....	1	Good crop and sample, Alberta.
White Russian.....	1	Good yield, Alberta.
Campbell's Triumph.....	1	Good sample, Alberta.
Golden Drop.....	1	Failure, Alberta.
Herisson Bearded.....	1	do
White Fife.....	1	M. Dubois, Duck Lake, reports 39 lbs. from 3 lbs. sown.
Wellman's Fife.....	8	One failure from drought, 2 failures from gophers, 5 good crops. J. B. Miller, Pincher Creek, reports 57 lbs. from 3 lbs. sown.
Azima Russian.....	1	R. McKernan, Edmonton, reports 33 lbs. from 3 lbs. sown.
Red Fife.....	13	Two failures from drought, 1 from gophers, 10 good crops. D. Ambler, Wetaskiwin, reports 180 lbs. from 3 lbs. sown.

BARLEY.

Petschora.....	1	Good crop, Alberta.
Common six-rowed.....	1	Failure, Alberta.
New Zealand.....	1	do
Danish Chevalier.....	3	One failure, 2 good crops, J. E. Dawson, Oxbow, reports 47 lbs. from 3 lbs. sown.
Garden Melon.....	1	Good crop, Alberta.
Goldthorpe.....	4	All report good crops. M. Dubois, Duck Lake, reports 60 lbs. from 3 lbs. sown.
Duck-bill.....	1	Good crop, Assiniboia.

BARLEY—*Concluded.*

Variety.	Report received.	Result of 3 lbs. sown.
Baxter's six-rowed	1	Good crop, Alberta.
California Prolific.....	1	do
Newton	2	Both good crops. D. Ambler, Wetaskiwin, reports 68 lbs. from 3 lbs. sown.
Odessa	2	Both report good crop, Alberta.
Thanet.....	4	Did well, Assiniboia and Alberta.
Kinver Chevalier.....	15	Five report crop eaten by gophers, 2 killed by drought and 8 good crops. J. B. Miller, Carievale, grew 81 lbs. from 3 lbs. sown.
Two-rowed Naked	1	Good crop for feed.
Oderbruch.....	1	Failure from drought, Alberta.

OATS.

Banner.....	10	1 killed by drought, 9 did well. Average yield 46 lbs. Largest yield 107 lbs. grown by A. E. Cox, Pincher Creek.
Improved Ligowo.....	4	2 killed by drought, 2 did well, largest yield 51 lbs. grown by Jas. Primeau, Pincher Creek.
Prize Cluster.....	9	2 killed by gophers, 7 did well, largest yield 56 lbs. M. Dubois, Duck Lake.
Bonanza	19	3 killed by gophers, 2 by drought, 15 did well, largest yield 93 lbs. A. E. Cox, Pincher Creek.
Winter Grey.....	5	All did well, early and good samples, largest yield 64 lbs. M. Dubois, Duck Lake.
Black Tartarian.....	3	All did well, good sample.
White Wonder.....	1	W. G. Morrison, Wapella, reports yield 30 lbs.
Rennie's Prize White	2	W. Barrowman, Edwell, " " 24 lbs
Welcome.....	1	Good crop, excellent sample.
Rosedale	1	do
Early Etampes.....	1	Failure, drought, Alberta.
Imported Irish.....	1	do
Abyssinia.....	1	Good sample, small yield.
Victoria Prize White.....	1	Heavy crop, good sample, early.
White Russian.....	1	Good crop, Alberta.
Golden Beauty.....	1	Light crop, do
Columbus	1	Bright straw, good sample, Alberta.
Abundance.....	1	Best of 15 varieties tried by R. McKernan, Edmonton.
Scottish Chief.	1	Good sample and yield.

PEASE.

Mummy.....	8	1 Hailed out, 7 did well, largest yield 50 lbs. grown by J. McKenzie, Coalfields.
Crown	1	Eaten by gophers.
Pride	9	2 Hailed out, 1 killed by drought, 6 did well, largest yield 30 lbs. A. E. Cox. Pincher Creek.

BROMUS INERMIS GRASS.

Bromus inermis.....	14	3 Failures from extreme dry weather, 11 did well and growers report an excellent catch and grass in good condition and in good shape for winter.
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SPRING RYE.

Spring Rye.	5	2 Failures, 3 did well, Average yield 33 lbs. Largest yield 56 lbs. grown by Jas. Le Becker, Olds, Alberta.
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ENSILAGE.

The ensilage last winter, though small in quantity was of excellent quality being very much the best so far made on this farm. This, no doubt, was due to the corn being further advanced when cut, than usual.

A large quantity has been put up this season but it is feared that on account of the corn being very backward, when it had to be cut (on account of frost) the ensilage will not be equal to that of last season. Mixed grain crops grown for fodder were also cut and put in silo.

FARMERS' MEETINGS.

Early last spring farmers' meetings were attended at the following places and addresses given on Experimental Farm work and results:—Moose Jaw, Estevan, Alameda, Oxbow, Carnduff, Carievale and Gainsboro.

CORRESPONDENCE.

During the twelve months, from 1st November, 1894, to 31st October, 1895, 2,751 letters were received and 3,114 dispatched from this farm. In letters received, reports on grain and other samples are not counted; and in letters despatched, circulars of instruction *re* grain and other samples, are not included.

The increase over same period 1893-94 indicates a growing interest in the work of the farm. The number of reports applied for and sent out is also much in excess of any previous year.

ACKNOWLEDGMENTS.

I beg to acknowledge, with thanks, the following donations to farm:—

Rev. John McKay, Elphinstone—Tree seeds, Native fruit bushes, Primrose potato. Calgary Herald, Calgary, Sugar beet seed.

EXHIBITIONS.

From 29th September to 7th August the Territorial Exhibition was held in Regina, Assiniboia, at which a large collection of Experimental Farm products were exhibited.

The exhibit consisted of 200 varieties of grain in specimen jars; 169 varieties grain in straw; 23 varieties of cultivated grasses; 55 varieties of native grasses; 85 varieties of vegetables grown 1895; 21 varieties of fruits in specimen jars, and 40 varieties of flowers.

On account of the labour and expense in connection with the above exhibit no other fairs were attended this fall.

VISITORS TO FARM.

Visitors from a distance were not so numerous as in preceding years, but the number of local visitors was largely in excess of any previous year.

Among the distinguished visitors were:—His Excellency the Earl of Aberdeen, Governor-General of Canada; Honourable J. A. Chapleau, Lieut.-Governor of Quebec, and ex-Lieut. Governor of N. W. T., Honourable Jos. Royal.

METEOROLOGICAL OBSERVATIONS.

Temperature, maximum and minimum for 12 months; average temperature for growing season; also range of temperature, sunshine, rainfall and direction of wind for growing season.

Location.—Longitude 102° west. Latitude, 52° north. Altitude, about 2,000 feet.

TEMPERATURE.

Maximum and Minimum for 12 months from November 1, 1894 to October 31, 1895

Months.	Maximum.			Minimum.		
1894.						
November.....	On	12th	51°.....	On	27th	—21°
December.....	"	20th	35°.....	"	27th	—34°
1895.						
January.....	"	14th	32°.....	"	23rd	—33°
February.....	"	27th	41°.....	"	4th, 7th, 8th	—38°
March.....	"	31th	50°.....	"	11th	—20°
April.....	"	13th	75°.....	"	18th	24°
May.....	"	22nd	78°.....	"	11th	17°
June.....	"	30th	87°.....	"	9th	33°
July.....	"	2nd, 3rd, 4th	95°.....	"	17th	34°
August.....	"	15th	89°.....	"	31st	28°
September.....	"	2nd	87°.....	"	29th	19°
October.....	"	2nd	70°.....	"	29th	— 5°

AVERAGE TEMPERATURE FOR GROWING SEASON, APRIL 1 TO SEPTEMBER 10.

Months.	Monthly Average.	
April	46·5°	} Daily Average, 53·8°
May.....	50·5°	
June.....	56°	
July.....	61·5°	
August.....	58·5°	
September 1 to 10.....	50°	

RANGE OF TEMPERATURE—GROWING SEASON, APRIL 1 TO SEPTEMBER 10.

Months.	Date.	Greatest Daily Range.		Degrees.	Average Daily Range
		From.	To.		
April.....	13	75	29	46	29°
May.....	30	77	28	49	29°
June.....	28	81	44	37	25°
July.....	2	95	60	35	24°
August.....	20	80	33	47	30°
September, 1 to 10.....	2	70	45	42	26°

Average range (season), 27°·1.

SUNSHINE.

Hours of bright sunshine from April 1 to September 10, and number of days in which there was no sunshine.

Month.	Hours.	No Sunshine. No. of Days.
April.....	178·3	5
May.....	257	2
June.....	178·2	5
July.....	234·9	3
August.....	249·1	5
September 1 to 10.....	43·5	2
Total.....	1,141	22

Average daily, 7 hours.

RAINFALL.

From April 1 to September 10, rain fell on 19 days as follows :—

Months.	No. of Days.	Inches.	Total.
April.....	0	0	11·08
May.....	2	2·1	
June.....	8	3·95	
July.....	5	3·83	
August.....	3	·6	
Sept 1 to 10.....	1	·6	
And on 4 days from September 10 to October 31, depth of.....			1·2
Total.....			12·28

Greatest depth in one day, 2 inches, on July 5th.

WIND.

Direction—Three observations each day, at 8, 14 and 20 o'clock. Times observed.

Months.	W.	N. W.	N.	N.E.	E.	S.E.	S.	S.W.
April.....	35	9	2	5	18	5	9	7
May.....	25	10	2	20	8	10	7	9
June.....	34	17	10	10	7	6	4	2
July.....	19	12	7	16	12	5	20	2
August.....	20	40	3	8	3	5	10	4
September 1 to 10.....	8	15	1	1	1	1	2	1
	141	103	25	60	49	32	52	25

I have the honour to remain, sir,
Your obedient servant,

ANGUS MACKAY,
Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B. C., 30th November, 1895.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit my report of the work done on the experimental Farm at Agassiz during 1895.

The year began with very high north winds which continued for nearly two weeks. The temperature did not go very low at any time but the wind being from a cold quarter and very drying, had a bad effect on almost all evergreen shrubs, and trees, even on hardy varieties such as the *Arbor-vitæ* of the East, which were browned and in many instances killed to the ground. Many other young shrubs and trees suffered much from the same cause. The evergreens, however, were most injured. At the same time, other varieties of shrubs of a tender nature passed the winter uninjured.

The weather in February was very warm and spring-like, the lowest recorded temperature being two degrees of frost. March was much colder, and the cool weather continued until nearly the end of April.

May was cool and rainy, with a sharp frost on the night of the fifth, which affected some of the more tender fruits, causing the almonds, which were then as large as marrowfat pease, to drop. June was warm, with showers in the first part of the month, and quite dry during the latter half, with scarcely any rain during July and August, which lessened the yields of grain and early potatoes, wherever the land was of a light or sandy nature. September was wet, over six inches of rain falling during that month, but the weather was warm, and October was warm also, and dry, with almost uninterrupted sunshine, which was so favourable to the root crops, that they have been very much better than was expected earlier in the season.

About twelve acres of valley land have been brought under cultivation this year, and the underbrush and lying timber removed from about as much more, which is being cleared of fir stumps as rapidly as possible, and as soon as cleared will be ploughed and got ready for a crop next spring.

The live stock on the Experimental Farm has done well this year. There have been no losses, and young animals have been in demand for breeding purposes.

A pair of Tamworth pigs, a boar and sow, have been added to the stock. The Haras National Co. sent out the Percheron stallion "Bonne Chance," but owing to the low prices realized of late for horses, and the scarcity of money, the stallion received very little patronage this season.

HEDGES.

All of the hedges mentioned in my last report have made a fine growth, except the different varieties of *Arbor-vitæ* and the *Retinosporas*, *aurea* and *plumosa*. The cold, dry winds of January shrivelled the foliage and twigs, as if they had been scorched by a fire. Many of the plants died, and all the others were cut back, in most cases to the ground. The English Holly was injured in the foliage at the time, but has since quite

recovered its greenness and vigour. The *Deutzias* *Pride of Rochester* and *Gracilis* bloomed very profusely; the latter during the last week of May and the former in the second week in June. The *Double White* and *Double Pink Deutzias* did not flower so profusely as usual, but made a vigorous growth. The *Ginnalian Maple* made a vigorous growth. It looked well all summer, and in autumn assumed very gorgeous colours. The *Purple Barberry* has grown well, and is very much admired. *Thunberg's Barberry* also looks well in the summer, and has made a very even growth, and in autumn is still more attractive when the leaves turn to a brilliant red. Hedges of *Dwarf Mugho Pine*, *English Yew*, *Irish Black Thorn*, *Darwin's Barberry*, and *Amur Privet*, were planted this spring, and are now well established. The *Osage Orange* hedge, planted as a farm hedge along the north-western boundary of the farm wintered better last winter than in previous years, and has made a fair growth during the summer.

The native *Arbor-vitæ*, along the railway fence, has made a rapid growth, and will soon present a very fine appearance.

BELTS OF FOREST TREES.

The trees in the shelter belt have grown so much that they shade nearly all the ground, and a row of potatoes planted alternately with the rows of trees was almost a failure owing to lack of sunshine. The forest trees planted on the mountains have in many cases made a fair growth, many of the walnuts planted there in the fall of 1893 and of 1894 have grown, but owing to the dense undergrowth of ferns, are making slow progress. The maple trees along the avenue, from the Hot Springs road to the buildings, and the elms along the Hot Springs road, have made a very strong growth, and many of them are now over 20 feet high.

The ornamental shrubs and trees planted along the road and near the Superintendent's residence, have made a vigorous growth, and the flowering varieties have furnished a succession of bloom from early in April up to the present time. The blooming of shrubs began with the *Forsythias* early in April, and ended with the *pendulus Desmodium*, which was a mass of flowers all through September and the first half of October. The roses, bulbs and annuals have bloomed very well all summer, having furnished a fine show of flowers from March, when the snow-drops appeared, up to the present time. The *Phlox Drummondii*, *Sweet Peas*, *Pansies* and *Verbenas* are still in bloom, apparently very little injured by the frosts we have had.

A large number of 3-lb. bags of grain and potatoes have been distributed to farmers throughout the province, and sample packages of strawberry plants and raspberry and blackberry canes; most of these having been sent to parties in the interior, especially to those districts where the conditions are not so favourable for fruit growing and where very little has been done in this way in the past. The reports received up to the present time have been very satisfactory.

Quite a number of applications have been received this season for samples of grain, small fruit plants, grape cuttings and scions of fruit trees, these are being supplied as far as practicable, as other work will permit.

The advantages of the seed distribution are being shown in the varied reports received; some of the varieties of grain and potatoes, giving very fine returns in some localities and poorer yields in others. This is to be expected, where there is such a diversity of climate as is to be found in British Columbia.

EXHIBITIONS.

Exhibits of fruits, the product of the experimental farm, were made at Victoria, Mission City, Ashcroft, Kamloops and Vernon. At Victoria ninety-three varieties of apples, thirty-five of plums, ten of pears, ten of peaches and two of grapes were exhibited. Quite a number of the earlier varieties of pears, plums and peaches were out of season before the exhibitions opened; and the plums, peaches and some of the early apples which were shown at Victoria were out of season and unfit for exhibition at any of the later shows.

FARMERS' CONVENTION.

The summer meeting of the Fruit Growers Association combined with the Dairy-men's Association and Central Farmers Institute was held at the experimental farm 1st and 2nd of August. His Honour Lieutenant Governor Dewdney presided. Addresses on various subjects of interest to fruit growers, dairymen and farmers were delivered by the Honourable the Lieutenant Governor, Hon. Col. Baker, the Director of Experimental Farms, Mr. W. Saunders, the Entomologist and Botanist, Mr. James Fletcher, and a number of others. The meeting was well attended by representative men from different parts of the province.

ACKNOWLEDGMENTS.

I beg to acknowledge with thanks the receipt of fruit trees, scions and seeds as follows :—

Messrs McGill and McDonald, Salem, Oregon. Trees of the Bing, Deacon and Centennial cherries, Roberson apple, Lincoln Coreless, Winter Bartlett, and La Belle Ruth pears, and seedling pear trees,

C. F. Pound, St. Elmo, B.C. Scions of seedling apple, Owen Jones.

Wm. Knight, Popcum, B.C. Scions of Ella and Peach seedling plums.

R. M. Palmer, Victoria, B. C. Scions of Wickron plum.

Richard Layritz, Victoria, B.C. Trees of Annie Spathe plum.

T. G. Earle, Lytton, B.C. Scions of seedling apple.

Prof. Shinn of Berkeley Agricultural College, Cal., scions of seven varieties of peaches, 12 varieties of plums, 7 varieties of apricots, 4 varieties of nectarines and ten of pears, also packages of 2 and 4 rowed barley.

Mrs. Jane MacQuarrie, Yale, B.C., packets of grains and vegetable seeds.

VISITORS.

The number of visitors to the farm is increasing every year. Very many of those who come are interested in the orchards on the bench lands on the mountain.

Their Excellencies Lord and Lady Aberdeen honoured the farm with a visit this year. His Excellency, being a fruit grower in British Columbia, was much interested in the orchards, and appeared to be well pleased with the appearance of the trees, many of which were loaded with fruit at the time of his visit.

EXPERIMENTS WITH FALL WHEAT.

Twenty-six varieties of fall wheat were sown on $\frac{1}{20}$ th acre plots, using seed at the rate of 90 lbs per acre. The soil was gravelly loam, and all plots suffered more or less from the high winds in January, which blew portions of the light soil off, exposing the roots. None of the varieties rusted.

FALL Wheat, test of varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	
			Ins.		Ins.		Lbs.	Bush.	Lbs.
Hungarian.....	Oct. 9....	July 24..	33 to 40	Soft.....	3 to 3 $\frac{1}{2}$	Bearded....	5,400	34	10
Early Red Clawson....	do 9....	do 24..	32 to 40	Weak.....	2 to 3 $\frac{1}{2}$	Beardless...	4,680	23	28
Carter's F.....	do 9....	do 24..	40 to 44	do	2 $\frac{1}{2}$ to 3	do	4,100	21	15
Willits.....	do 9....	do 24..	38 to 42	Stiff	3 to 3 $\frac{1}{2}$	do	3,800	20	52
Stewart.....	do 9....	do 24..	36 to 40	do	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$	do	2,800	20	28
Carter's K.....	do 9....	Aug. 1..	30 to 36	do	2 to 3 $\frac{1}{2}$	do	3,020	20	27
Manchester.....	do	July 24..	28 to 36	do	1 $\frac{1}{2}$ to 3 $\frac{1}{2}$	do	3,800	20	25
Johnson.....	do 9....	do 24..	36 to 40	do	2 to 3 $\frac{1}{2}$	Bearded....	3,200	20	
Carter's H.....	do 9....	do 24..	42 to 48	Weak.....	3 to 4	Beardless...	3,200	20	
Golden Cross.....	do 9....	do 24..	42 to 50	Stiff	2 to 4	Bearded....	4,700	19	47
Carter's G.....	do 9....	Aug. 1..	36 to 40	do	3 to 3 $\frac{1}{2}$	Beardless...	3,500	19	35
Carter's J.....	do 9....	July 24..	40 to 46	Weak.....	3 to 3 $\frac{1}{2}$	do	3,000	19	35
Carter's D.....	do 9....	do 24..	36 to 40	Stiff	3 to 3 $\frac{1}{2}$	do	3,300	18	20
Volunteer.....	do 9....	do 26..	30 to 40	do	1 to 4	Bearded....	3,200	17	55
White Queen.....	do 9....	Aug. 1..	24 to 36	do	1 to 3	Beardless...	2,600	17	47
Martin's Amber.....	do 9....	July 26..	30 to 36	do	1 $\frac{1}{2}$ to 3 $\frac{1}{2}$	do	3,400	17	42
Canadian Velvet Chaff	do 9....	do 24..	32 to 38	do	1 $\frac{1}{2}$ to 4	do	2,500	16	52
Fill Measure.....	do 9....	Aug. 1..	28 to 36	Weak.....	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	do	2,700	16	37
Tasmania.....	do 9....	July 24..	36 to 40	do	1 to 2 $\frac{1}{2}$	Bearded....	3,000	16	15
Democrat.....	do 9....	do 21..	30 to 42	Stiff	2 to 3	do	3,060	16	15
Royal Prize Red	do 9....	Aug. 1..	24 to 30	do	1 $\frac{1}{2}$ to 2	Beardless...	2,300	15	7
Carter's B.....	do 9....	July 30..	32 to 36	do	2 to 3	do	2,700	14	53
Carter's E.....	do 9....	do 30..	30 to 33	do	2 to 2 $\frac{1}{2}$	do	2,700	13	32
Carter's C.....	do 9....	Aug. 1..	30 to 36	do	2 $\frac{1}{2}$ to 3	do	2,720	14	28
Square Head	do 9....	do 1..	18 to 30	Weak.....	1 to 2	do	1,900	13	23
Carter's A.....	do 9....	July 30..	36 to 40	do	2 $\frac{1}{2}$ to 3	do	2,300	10	6

EXPERIMENTS WITH SPRING WHEAT.

Thirty-two varieties of spring wheat were tested under similar conditions, all being sown on the 19th April, except Red Fern and White Fife, which were sown three days later. They were sown broadcast at the rate of 90 lbs. per acre. The soil was a sandy loam and the size of the plots one-twentieth acre each.

The yield is light in most cases, but owing to the dry summer and harvest the grain is harder and brighter than usual. None of the varieties rusted.

Six varieties, one lb. each, of new cross-bred wheats from the Central Experimental Farm, were sown alongside and at the same rate of seed per acre. The yield in each case was good and some of these new varieties are promising, the straw being stiff and the heads well filled with plump, bright grain.

SPRING WHEAT—Test of varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	
				Inches.		Inches.		Lbs.	Bush.	Lbs.
Rio Grande.....	April 19	Aug. 26	128	36 to 40	Stiff.....	4 to 4½	Bearded..	4,900	33	10
White Fife.....	" 22	" 26	128	33 to 36	"	3½ to 4	Beardless.	4,800	30	55
Beaudry.....	" 19	" 19	111	30 to 31	"	3 to 3½	Bearded..	3,500	22	40
Advance.....	" 19	" 19	111	31	"	3 to 4	" ..	3,180	21	
Herisson Bearded...	" 19	" 17	109	30 to 33	Weak	3 to 3½	" ..	3,500	21	
Admiral.....	" 19	" 19	111	30	Stiff.....	3 to 4	Beardless.	2,860	20	
Alpha (bald).....	" 19	" 14	106	30 to 32	"	3 to 3½	" ..	2,800	19	30
Rideau.....	" 19	" 20	122	30 to 34	"	3 to 3½	" ..	2,600	19	30
Dion's.....	" 19	" 19	111	36 to 40	Medium.....	3 to 3½	Bearded..	3,800	19	15
Campbell's W. Chaff.	" 19	" 17	109	36 to 40	Stiff.....	2 to 2½	Beardless.	3,100	19	10
Captor.....	" 19	" 19	111	33 to 36	"	2½ to 2¾	" ..	3,040	17	50
Red Fife.....	" 19	" 20	112	33 to 36	"	2 to 3	" ..	2,400	17	25
Old Red River.....	" 19	" 17	109	35 to 40	"	2 to 2½	" ..	2,700	17	20
Huron.....	" 19	" 13	105	36 to 40	"	2¾ to 3	Bearded..	3,300	17	10
Blenheim.....	" 19	" 20	112	30 to 33	"	3 to 4	" ..	2,400	17	10
Abundance.....	" 19	" 14	106	33	"	3 to 3½	" ..	3,100	16	40
Red Fern.....	" 22	" 17	119	30 to 34	Weak	2½ to 3	" ..	2,900	16	40
Preston.....	" 19	" 17	109	36 to 42	Stiff.....	2½	" ..	2,500	16	40
Wellman's Fife.....	" 19	" 17	119	36 to 40	"	3 to 3½	Beardless.	2,300	16	40
Golden Drop.....	" 19	" 14	106	34 to 36	"	3 to 3½	" ..	3,200	16	30
Crown.....	" 19	" 17	109	30 to 34	"	3 to 3½	Bearded..	2,400	16	
Major.....	" 19	" 20	112	30 to 36	"	2 to 2½	Beardless.	2,200	15	40
Alpha (bearded)....	" 19	" 20	112	28 to 30	Weak	2½ to 3	Bearded..	2,100	15	30
Monarch.....	" 19	" 20	122	36 to 42	Stiff	3 to 3½	Beardless.	2,760	15	20
Goose.....	" 19	" 20	112	30 to 33	"	2 to 2½	Bearded..	2,700	15	20
Ladoga.....	" 19	" 12	104	30 to 34	"	2 to 3	" ..	2,600	15	10
Pringle's Champlain.	" 19	" 17	109	34 to 36	Medium.....	2 to 2½	" ..	2,300	14	40
Percy.....	" 19	" 17	109	32 to 36	Stiff	2 to 2½	Beardless.	2,300	14	20
Gehun.....	" 19	" 19	111	30 to 32	"	2 to 2½	" ..	3,000	14	10
White Connell.....	" 19	" 20	122	30 to 33	"	3 to 3½	" ..	1,900	14	
Emporium.....	" 19	" 20	122	36 to 42	"	3¼ to 3¾	Bearded..	2,700	13	50
Stanley.....	" 19	" 17	119	30 to 33	"	2 to 2½	Beardless.	2,000	13	20

SPRING WHEAT.— $\frac{1}{50}$ th Acre Plots of Cross-bred Sorts.

Vernon..... 1 lb.	April 27	Aug. 26	121	33 to 36	Stiff and bright.	3 to 4	Bearded..	5,400	32	37
Beauty.....	" 27	" 26	121	33 to 40	" ..	3 to 4	Beardless.	6,915	32	15
Progress.....	" 27	" 20	115	33 to 36	" ..	3 to 3½	" ..	5,130	31	30
Countess.....	" 27	" 20	115	30 to 36	" ..	3 to 3½	" ..	4,950	28	52
Dawn.....	" 27	" 20	115	28 to 34	" ..	3 to 3½	" ..	3,870	26	15
Dufferin.....	" 27	" 20	115	30 to 36	" ..	2 to 3	Bearded..	4,770	21	45

EXPERIMENTS WITH BARLEY.

Thirty-five varieties of barley were tested, 17 of these were two-rowed and 18 six-rowed; $\frac{1}{50}$ th of an acre of each was sown, and the same amount of seed was used in each case, about two bushels per acre. All were sown on loamy soil, on the 24th of April. The two-rowed varieties, as will be seen by the accompanying table, have averaged the highest yields. No rust was observed in any of the plots.

TWO-ROWED BARLEY.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.
				Inches.		Inches.	Lbs.	bush. lbs
Goldthorpe.....	April 24	Aug. 16	114	28 to 36	Stiff	2½ to 3½	5,600	44 8
Duck-bill.....	" 24	" 15	113	30 to 34	"	3 to 3½	4,700	43 46
Canadian Thorpe.....	" 24	" 15	113	26 to 32	"	3 to 3½	4,300	41 32
Danish Chevalier.....	" 24	" 15	113	30 to 36	"	3½ to 4	4,720	39 28
Monck	" 24	" 16	114	30 to 36	"	3 to 3½	4,400	38 26
French Chevalier.....	" 24	" 12	110	24 to 30	"	3½ to 4	3,300	38 16
Beaver	" 24	" 15	113	28 to 34	"	3 to 4	4,300	36 2
Newton	" 24	" 15	113	26 to 30	"	3 to 3½	3,500	34 8
Prize Prolific.....	" 24	" 16	114	.....	" ....	.....	3,520	33 16
Golden Grains	" 24	" 14	112	30 to 34	"	3 to 3½	3,900	32 34
Thanet	" 24	" 16	114	30 to 33	"	3 to 3½	3,500	32 24
Bolton.....	" 24	" 12	110	28 to 30	"	2½ to 3	4,700	30 25
Kinver Chevalier.....	" 24	" 16	114	26 to 30	"	2½ to 3½	3,200	28 16
Victor.....	" 24	" 12	110	30 to 34	"	3 to 3½	4,160	27 34
Sidney	" 24	" 12	110	26 to 32	"	2½ to 3	4,100	27 14
Rigid	" 24	" 16	114	26 to 30	"	2 to 2½	3,500	26 12
California Prolific.....	" 24	" 15	113	24 to 30	"	3½ to 3¾	2,200	24 30

SIX-ROWED BARLEY.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.
				Inches.		Inches.	Lbs.	Bush. Lbs.
Odessa.....	April 24	Aug. 9	107	28 to 34	Stiff....	2 to 2½	4,500	38 36
Oderbruch.....	" 24	July 30	97	20 to 24	"	2½ to 3½	4,400	36 27
Trooper	" 24	Aug. 9	106	22 to 26	"	2 to 3	5,400	33 46
Petschora.....	" 24	July 29	96	22 to 28	"	1½ to 2½	3,800	33 16
Stella	" 24	Aug. 9	106	28 to 36	"	3 to 3½	5,500	32 4
Vanguard	" 24	" 2	99	30 to 36	"	2 to 2½	3,800	31 12
Royal.....	" 24	July 30	97	24 to 36	"	2½ to 3	3,900	29 38
Summit.....	" 24	Aug. 9	106	20 to 24	"	2 to 2½	3,300	29 33
Phoenix.....	" 24	" 6	103	24 to 28	"	2½ to 3½	4,300	28 41
Rennie's Improved	" 24	July 30	97	24 to 30	"	2 to 3	4,000	28 16
Common Six-rowed	" 24	Aug. 9	106	18 to 26	Weak ..	1½ to 2½	3,500	28 6
Champion Beardless.....	" 24	July 29	96	28 to 36	"	2 to 3	3,600	27 47
Mensury.....	" 24	" 30	97	28 to 36	Stiff....	2 to 3	3,500	27 44
Success (Beardless).....	" 24	" 29	96	28 to 36	Weak ..	2 to 3½	3,300	26 37
Surprise	" 24	Aug. 9	106	24 to 28	Stiff....	2 to 3½	4,100	24 14
Nugent.....	" 24	" 9	106	24 to 30	"	2½ to 3	2,500	24 8
Pioneer.....	" 24	July 30	97	28 to 30	"	2½ to 3½	5,100	23 46
Excelsior (Beardless).....	" 24	Aug. 2	100	28 to 34	"	2 to 3	3,300	22 24

EXPERIMENTS WITH OATS.

Forty-eight varieties of oats were tested on land which had produced a crop of corn in 1894. The character of the soil was loamy and very even throughout, and all the plots except Electric and Early Maine, were sown on the same day, and all on plots of ½th acre each, except Electric, of which ⅛th acre only was sown.

Early Gothland and Banner have done well again this year. These varieties have given the best average yield for a number of years, and as both are good milling oats and the straw stands up well, they may be considered two of the best oats yet tested here.

Owing to delay in procuring seed, the Early Maine was not sown for a month after the other plots, which accounts for the poor yield. No rust was observed on any of the varieties.

OATS.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.
				Inches.		In.		Lbs.	Bush. Lbs.
Early Gothland	April 23	Aug. 19	118	36 to 42	Stiff.....	9½	Sided.....	5,600	59 14
New Electric.....	do 27	do 26	121	34 to 38	do	7½	Branching..	3,110	56 32
Hazlett's Seizure.....	do 23	do 19	118	40 to 46	do	8½	do	4,400	52 32
Cream Egyptian.....	do 23	do 16	115	40 to 46	do	6½	Sided.....	4,160	49 14
Early Archangel.....	do 23	do 19	118	40 to 46	Medium..	9	Branching..	3,400	48 28
Early Golden Prolific.....	do 23	do 21	120	30 to 34	Stiff.....	9	do	3,700	48 18
Banner	do 23	do 21	120	33 to 40	do	8	do	2,800	48 3
Golden Beauty... ..	do 23	do 22	121	30 to 36	do	9	do	3,900	47 12
Lincoln	do 23	do 21	120	30 to 36	do	8½	do	4,020	46 26
Abyssinia.....	do 23	do 22	121	36 to 40	do	8	Sided.....	4,000	46 6
Early Blossom.....	do 23	do 22	121	30 to 36	do	8½	Half-sided..	4,000	45 20
Bonanza.....	do 23	do 21	120	30 to 36	Medium..	9	Branching..	3,400	44 24
Abundance.....	do 23	do 21	120	30 to 36	Stiff.....	7½	do	3,700	43 28
American Beauty.....	do 23	do 21	120	32 to 36	do	8	do	3,400	42 22
Bavarian	do 23	do 21	120	32 to 36	Medium..	7½	do	4,000	42 12
Poland White	do 23	do 16	115	36 to 40	do	7	do	3,700	41 6
Improved Ligowo	do 23	do 19	118	40 to 46	Stiff.....	7½	do	2,900	40 30
Black Brie.....	do 23	do 26	125	24 to 30	do	8½	do	4,300	40 15
Prolific Black Tartarian....	do 23	do 19	118	30 to 36	do	6½	Sided.....	3,900	40 10
Coulommiers (Black).....	do 23	do 26	125	30 to 36	do	8	Branching..	4,100	40
White Wonder.....	do 23	do 16	115	36 to 42	Medium..	8½	do	4,200	39 24
Columbus	do 23	do 21	120	26 to 30	Stiff.....	7½	do	2,700	38 8
Joanette (Black).....	do 23	do 21	120	24 to 30	do	6½	do	3,500	37 32
Rosedale.....	do 23	do 19	118	24 to 30	do	7½	Half-sided..	3,100	37 32
California Prolific (Black)...	do 23	do 26	125	30 to 36	do	7	do	3,400	37 22
Flying Scotchman.....	do 23	do 16	115	36 to 40	Fair.....	8	Branching..	3,000	36 16
Prize Cluster.....	do 23	do 16	115	40 to 48	Stiff.....	7½	do	3,500	36 14
Early Etampes.....	do 23	do 21	120	24 to 30	Weak....	7½	do	3,000	36 7
Giant Cluster.....	do 23	do 21	120	30 to 34	Stiff.....	8½	Sided.....	3,500	36 6
White Monarch	do 23	do 21	120	30 to 34	do	5½	Branching..	4,100	35 30
White Schonen.....	do 23	do 23	122	36 to 40	do	6	do	3,700	35 30
Cave.....	do 23	do 21	120	24 to 28	do	7	Sided.....	2,800	35 30
Imported Irish.....	do 23	do 16	115	30 to 34	do	6½	Branching..	2,820	35 20
Wallis.....	do 23	do 21	120	36 to 40	do	6	do	3,200	35 10
American Triumph.....	do 23	do 26	125	36 to 42	Medium..	7	do	2,800	34 26
White Russian.....	do 23	do 26	125	36 to 40	Stiff.....	6½	Half sided..	3,000	34 24
Rennie's Prize White.....	do 23	do 19	118	36 to 40	do	7½	Branching..	2,800	34 24
Scottish Chief.....	do 23	do 19	118	34 to 40	Medium..	6	do	2,600	34 24
Holstein Prolific.....	do 23	do 21	120	34 to 40	Stiff.....	6½	do	2,800	33 18
Doncaster Prize.....	do 23	do 22	121	30 to 34	Medium..	6	do	2,820	32 2
Winter Grey.....	do 23	do 16	115	34 to 40	do	7	do	3,000	31 6
Oderbruch.....	do 23	do 26	125	32 to 36	Fair.....	7	Half sided..	3,000	30 30
Welcome.....	do 23	do 21	120	30 to 36	do	7½	Branching..	3,300	30 20
Siberian.....	do 23	do 26	125	30 to 36	do	5½	Half sided..	4,000	30
Wide Awake.....	do 23	do 21	120	30 to 36	Stiff.....	...	Branching..	2,300	28 8
Victoria Prize.....	do 23	do 16	115	30 to 36	Medium..	5	do	2,800	24 24
Early Maine.....	May 29	Sept. 14	107	30 to 34	Stiff.....	5	Sided.....	2,320	23 28
Scotch Hopetown.....	Apr. 23	do 19	118	26 to 30	Medium..	4½	Branching..	2,500	17 2

EXPERIMENTS WITH PEASE.

Twelve varieties of field pease were tested under the same conditions as to soil and treatment. The soil was sandy loam, which was seeded to clover with the pease. The clover made a rank growth which has lessened the yield, but as all were alike in that respect, the value of the test for comparison is not materially affected. The size of the plots was 1/20th of an acre each. All the varieties made a strong growth.

PEASE—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.		Length of Pod.	Size of Pea.	Yield per Acre.		Remarks.
				In.	Lbs.	In.		Bush.	Lbs.	
Multiplier	Apr. 25.	Aug. 30.	127	48 to 60	350	2 to 3	Small ..	33	20	Pods very plentiful and well filled.
Golden Vine.....	" 25.	" 23.	120	43 to 54	195	2½ to 3	Small ..	28	20	Very well podded and pods filled to end.
Crown... ..	" 25.	" 19.	116	30 to 36	180	2½ to 3	Small ..	26	25	Pods well filled and very plentiful.
Prince Albert.....	" 25.	" 30.	127	36 to 48	240	2½ to 3	Small ..	25	5	Pods plentiful and fairly well filled.
Prussian Blue.....	" 25.	" 29.	126	33 to 40	170	2½ to 3½	Medium	24	40	Pods well filled.
Mummy.....	" 25.	" 23.	120	33 to 40	154	2 to 3	Above medium	22	50	Pods did not fill well.
Black-eyed Marrow-fat.....	" 25.	" 19.	116	40 to 48	160	3 to 3¼	Large ..	22	40	Not very well podded.
New Potter.....	" 25.	" 23.	120	38 to 48	165	1½ to 2½	Large ..	22	30	Pods short, but well filled.
White Marrowfat...	" 25.	" 29.	126	36 to 48	175	3 to 3½	Large ..	21	25	Pods not filled to end.
Centennial	" 25.	" 30.	127	28 to 36	150	1½ to 2½	Medium	21	..	Pods not well filled to end.
Pride	" 25.	" 13.	110	30 to 36	140	2 to 3	Large ..	20	..	Pods long, but not well filled.
Canadian Beauty....	" 25.	" 29.	126	30 to 36	135	3 to 3½	Large ..	18	..	Pods not filled to end.

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

OATS—EARLY, MEDIUM AND LATE SOWING.

The Abundance and Banner were the varieties chosen for this test. The late sown plots averaged a higher yield than those earlier sown, but this may partly be accounted for by additional cultivation, as all the unsown plots received a thorough harrowing as each successive plot was sown. The soil was of a loamy character, and the size of the plots was 1/20th acre each ; no rust was observed on any of them.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.
								Lbs.	Bush.	
Abundance.....	Mar. 16	Aug. 8	145	30 to 36	Stiff.....	8	Branching..	2,900	37	22
"	" 23	" 10	140	30 to 36	"	7	" ..	2,500	36	16
"	" 30	" 12	135	30 to 36	"	7	" ..	2,560	36	26
"	April 6	" 14	130	28 to 30	"	5½	" ..	2,400	31	8
"	" 13	" 17	126	30 to 34	"	6 to 7	" ..	2,600	41	6
"	" 20	" 20	122	30 to 34	"	6 to 7	" ..	2,900	43	8
Banner.....	Mar. 16	" 8	145	33 to 36	"	7 to 8	" ..	3,800	49	4
"	" 23	" 10	140	33 to 36	"	7 to 8	" ..	3,500	48	28
"	" 30	" 12	135	33 to 36	"	7 to 8½	" ..	3,560	54	14
"	April 6	" 14	130	33 to 36	"	7 to 8½	" ..	3,800	55	5
"	" 13	" 17	126	30 to 36	"	7½ to 8½	" ..	3,200	55	10
"	" 20	" 20	122	30 to 36	"	7 to 7½	" ..	3,000	49	14

BARLEY—EARLY, MEDIUM AND LATE SOWINGS.

Oderbruch six rowed and Canadian Thorpe two-rowed were again used for this test. The land was part of an old timothy meadow which had been cropped for a number of years, and was in very poor condition. It had received a light dressing of barn-yard manure once since we began working the farm and had yielded a light crop of clover in 1894 ; the second growth was turned under and the field is improving, but is still rather poor, as will be seen when the yields of the plots are compared with the same varieties under different conditions. The soil was sandy loam and the size of the plots $\frac{1}{20}$ th acre each. No rust was observed on any of these plots.

Name of Variety.	Date of Sowing.	Date of Ripen-ing.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	
				Inches.		Inches.		Lbs.	Bush.	Lbs.
Oderbruch.....	Mar. 16	July 29	135	18 to 30	Weak	1½ to 2½	6-rowed...	2,700	15	40
"	" 23	" 30	129	18 to 24	"	1½ to 2½	"	2,300	16	2
"	" 30	Aug. 1	124	18 to 24	"	1½ to 2½	"	2,360	16	22
"	April 6	" 6	122	20 to 28	"	2 to 2½	"	2,500	16	42
"	" 13	" 8	117	20 to 28	"	2 to 2½	"	2,700	21	12
"	" 20	" 10	112	24 to 30	"	2 to 2½	"	3,200	21	2
Canadian Thorpe....	Mar. 16	" 15	152	24 to 30	Medium....	1½ to 2	2-rowed...	2,800	13	36
"	" 23	" 17	147	20 to 24	"	1½ to 2	"	2,200	14	23
"	" 30	" 19	142	24 to 30	Stiff	1½ to 2	"	2,800	15	40
"	April 6	" 21	147	24 to 30	"	1½ to 2	"	2,600	15	10
"	" 13	" 22	141	28 to 34	"	2 to 2½	"	3,600	16	22
"	" 20	" 23	135	30 to 36	"	2½ to 3	"	4,800	24	18

WHEAT—EARLY, MEDIUM AND LATE SOWINGS.

These test plots were sown along side of, and on land similar to, the early, medium and late barley tests, and the yield was affected by the same cause. This field is again, in clover and another clover sod turned under will, it is expected, bring it up to fair condition, as the catch has been a good one and the growth luxuriant. The varieties of wheat chosen for this test were Stanley and Red Fife. The size of the plots was $\frac{1}{20}$ th acre each ; no rust was seen on any of them.

Name of Variety.	Date of Sowing.	Date of Ripen-ing.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	
				Inches.		Inches.		Lbs.	Bush.	lbs.
Stanley	Mar. 16	Aug. 12	149	30 to 36	Stiff	1 to 2	Beardless.	1,800	10	30
"	" 23	" 14	144	30 to 36	"	1½ to 2	"	2,600	16	30
"	" 30	" 16	139	30 to 36	"	1½ to 2	"	2,300	16	50
"	April 6	" 19	135	30 to 36	"	2 to 3½	"	3,400	23	10
"	" 13	" 21	130	30 to 36	"	2 to 3½	"	3,600	23	30
"	" 20	" 23	125	30 to 36	"	2 to 3	"	2,800	17	10
Red Fife	Mar. 16	" 17	154	26 to 30	"	1 to 1½	"	1,640	9	30
"	" 23	" 20	150	26 to 30	"	1 to 1½	"	1,720	10	10
"	" 30	" 22	145	26 to 30	"	1 to 1½	"	1,600	8	35
"	April 6	" 24	140	30 to 34	"	2 to 2½	"	3,000	19	40
"	" 13	" 26	135	30 to 36	"	2 to 2½	"	2,800	18	30
"	" 20	" 27	129	30 to 36	"	1 to 2	"	2,500	15	40

PEASE—EARLY, MEDIUM AND LATE SOWINGS.

Mummy and Golden vine were the varieties chosen for this test. The soil was loamy and the size of the plots $\frac{1}{20}$ th acre each. The land had been in crop for four years previously, and had received no manure, and as manure was not available it was thought better to seed with red clover, which was done with this crop, and a good catch obtained. The first plots of each variety gave a comparatively small yield, perhaps, owing to the cold wet weather at the time, but pease require a considerable time to ripen, and if wet weather sets in at harvest time are difficult to cure. For this reason early sowing here is preferable for pease.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw per Acre	Length of Pod.	Size of Pea.	Yield per Acre.	Remarks.
					Inches.	Lbs.	In.		Bus. Lb.	
Mummy....	Mar. 18..	Aug. 6..	141	Fair ...	26·33	3,240	2—3	Above medium	28 20	Vines healthy & well podded.
"	" 25..	" 8..	136	Strong .	32·36	4,100	2—3	" ..	33 40	" ..
"	April 1..	" 10..	131	" ..	32·36	4,000	2—3	" ..	31 20	" ..
"	" 8..	" 13..	127	" ..	32·36	3,600	2—3	" ..	29 ..	" ..
"	" 15..	" 16..	123	Fair ...	32·36	3,400	2—3	" ..	29 40	" ..
"	" 22..	" 19..	119	Strong .	32·36	3,900	2—3	" ..	29 ..	" ..
Golden Vine	Mar. 18..	" 6..	141	Fair ...	30·40	3,100	2-2½	Small...	27 40	Vines healthy, pods not evenly filled.
" ..	" 25..	" 8..	136	Strong .	36·44	4,600	2—3	" ..	36 ..	Pods well filled.
" ..	April 1..	" 10..	131	Medium	36·40	3,800	2—3	" ..	30 20	" ..
" ..	" 8..	" 13..	127	" ..	36·40	3,300	2-2½	" ..	28 20	Not as well filled as plots two and three.
" ..	" 15..	" 16..	123	" ..	36·40	3,400	2—3	" ..	27 40	" ..
" ..	" 22..	" 19..	119	" ..	30·36	4,000	2-2½	" ..	29 ..	Pods very well filled.

VETCHES—TEST OF VARIETIES.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Seed.	Yield per Acre.
							Inches.	Lbs.	Inches.		Bush.
White.....	Loam	$\frac{1}{40}$	April 29	Sept. 6..	130	Strong .	40—48	185	2½—3	Very s'l	33
*Black.....	"	$\frac{1}{40}$	" 29	Oct. 8..	162	Medium	36—40	.....	2½—3	" ..	18

* The black vetches ripened so late that it was difficult to cure them.

MIXED GRAIN GROWN FOR HAY.

Mixture Sown.			Soil.	Size of Plot.	Sown.	Cut.	Weight, green, per acre.		Weight, dry, per acre.	
No. 1 Mixture.							Tons.	Lbs.	Tons.	Lbs.
1 bush.	Golden Vine Pease.	} per acre ..	Sandy loam.	$\frac{1}{10}$ acre..	April 30	Aug. 1	6	700	3	700
1 do	Red Fife Wheat...									
1 do	Banner Oats.....									
No. 2 Mixture.										
1 do	Golden Vine Pease.	} do ..	do ..	do ..	do 30	do 1	6	1,800	3	50
1 do	Prize Prolific Barley									
1 do	Banner Oats.....									

EXPERIMENTS WITH CORN.

The land for this test had been cleared and ploughed the winter previous, and although ploughed three times and carefully harrowed each time it was not in good condition for corn, but as it was to be planted with apple trees, it was thought desirable to give the trees the benefit of a hoed crop. The corn crop is a very light one. Eighteen varieties were in the test, one of which the North Dakota from seed raised on the experimental farm at Brandon, Man., did not germinate well. The soil was sandy loam, the drills were 36 inches apart and plants about 12 inches apart in the rows. The hills were 3 feet apart each way, with 2 to 4 plants in each hill. They were all sown from the 23rd to 25th of May, and the yield per acre has been calculated from the product of two rows, each 66 feet long. Mitchell's Extra Early was the only variety in this test that produced glazed corn.

CORN—Test of Varieties.

Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
	Inches.					Tons.	Lbs.	Tons.	Lbs.
Country Gentleman.....	60-72	Leafy	Aug. 18..	Aug. 30..	Ears formed	12	800	12	200
Rural Thorough-bred									
White Flint	84-96	Very leafy..	" 20..	Sept. 16..	do ..	12	200	12	860
Angel of Midnight.....	70-80	Leafy	Sept. 2..	" 10..	do ..	9	1140	9	920
Extra Early Huron Dent.	80-90	"	" 16..	"	Tasselled....	7	1620	7	520
Pearce's Prolific	66-72	"	Aug. 2..	Aug. 12..	Late Milk..	7	1180	7	740
Champion White Pearl...	84-96	Fairly leafy.	" 20..	Sept. 8..	Ears formed	7	960	7	80
Red Cob Ensilage.	84-96	Leafy	Sept. 8..	"	Tasselled....	7	740	6	1640
Canada White Flint.....	72-84	Very leafy..	Aug. 18..	Sept. 12..	Ears formed	7	300	6	760
Longfellow	84-100	"	" 10..	Aug. 22..	Early Milk..	7	80	7	300
Sanford White Flint	60-72	Leafy	" 18..	Sept. 2..	Ears formed	6	1800	6	1340
Compton's Early.....	72-84	"	" 12..	Aug. 25..	Early Milk.	6	980	6	320
Mammoth Yellow Flint..	84-96	"	" 20..	Sept. 1..	Cobs formed	6	540	6	1200
Giant Prolific Ensilage...	86-95	"	Sept. 18..	"	Tasselled....	5	560	5	1440
Canadian Dent.	95-105	Not leafy...	Aug. 15..	Aug. 30..	Ears formed	5	230	5	560
Mitchell's Early.....	44-54	Fairly leafy.	" 2..	Sept. 10..	Matured...	4	1020	4	800
North Dakota.....	60-66	Leafy	" 15..	Aug. 28..	Cobs formed	4	800	5	1980
do Manitoba Seed	48-66	"	" 15..	" 28..	do ..	3	1150	3	600
White Cap Yellow Dent..	80-90	"	" 14..	" 28..	Ears formed	.....		10	680

MILLETS.

Small plots, each of German Golden, and White French Millets were sown 27th April. The soil was a warm sandy loam which had only produced one crop.

The German Golden yielded the best, the stalks being longer and leafier and the heads were longer and more compact. Both were cut when the seed was in the milk.

Yield per acre, when dried.	Tons.	Lbs.
German Millet.....	3	780
French ".....	2	1440

YIELD OF HAY AND MIXED GRAIN, CUT FOR FODDER.

	Tons.	Lbs.
Total hay crop	27	1681
Mixed grain cut and cured for feed.....	8	881

CRIMSON CLOVER.

A few pounds of crimson clover seed were received in the spring and sown at once. It made a growth of from eight to twelve inches, but did not stool freely. The crop would not yield over one ton per acre of cured feed, but as it was wanted for ploughing under to fit the land for small fruits it was not cut.

COW GRASS OR PERENNIAL RED CLOVER.

A small package of seed of this clover was received and sown last spring. It grew luxuriantly and covered the ground. The stalks being from 18 to 30 inches long, and estimated to yield nearly three tons of cured hay. This may prove a desirable addition to the list of fodder plants.

JAPANESE CLOVER.

A package of this seed was sown in May. It has grown from two to three inches but has not blossomed. This may be useful for pasture, but is not promising.

SACCHALINE.—(*Polygonum Sacchalinense.*)

One hundred young seedlings of this new fodder plant were received from the Central Experimental Farm in June. The weather was very dry and hot, and the plants being succulent were in very poor condition when received. Only a few of them made a feeble growth, and there was not enough to test the feeding qualities of this largely advertised fodder plant.

LATHYRUS SYLVESTRIS WAGNERI.

Seed of this fodder plant has been distributed in small packages to farmers residing in the interior of British Columbia and in the drier portions of Alberta. A few have reported that the seed germinated and made the usual growth of from 8 to 15 inches, and that the plants will be transplanted early next spring. Instructions were sent with each package of seed as to sowing, and subsequent treatment, and reports were asked for of its growth from year to year.

EXPERIMENTS WITH TURNIPS.

Two sowings were made, at an interval of 14 days, of each of the twelve varieties tested. The soil was a sandy loam and had been in crop for the five previous years, and had only had one light dressing of stable manure. None of the test plots gave as large

a crop as the field crop which was sown on heavier land. The first set of plots was sown on the 20th of May, the second on the 3rd June, in rows 2½ feet apart, and both were pulled on 5th November. The yield was estimated from the product of two rows each 66 feet long.

TURNIPS—Test of varieties.

Name of Variety.	Yield per Acre.								Description of Variety
	1st Plot.		1st Plot.		2nd Plot.		2nd Plot.		
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	
Hartley's Bronze Top.....	13	576	442	56	12	816	213	36	Globe, bronze top.
East Lothian..	13	400	440		8	896	281	36	Globe-sh'p'd, purple top
Carter's Elephant.....	12	1,344	422	24	8	720	278	40	Oblong, purple top.
Rennie's Prize Purple Top...	12	640	410	40	11	1,232	387	12	Globe sh'p'd, purple top
Champion Purple Top.....	11	1,232	337	12	10	1,120	352		Globe-shaped, red top.
Lord Derby.....	10	1,120	352		9	1,712	328	32	Globe, purple top.
Jumbo or Monarch.....	10	64	334	24	11	1,760	396		Globe shaped, red top.
Skirving's Swede.....	9	1,008	316	48	8	1,428	290	28	do purple top.
Imperial Swede.	8	1,248	287	28	7	1,840	264		do do
Purple Top Swede.....	8	544	275	44	8	1,600	293	20	do do
Giant King.	7	80	234	40	6	1,728	228	48	Oval do
Elephant's Master.....	6	1,200	220		6	1,024	217	4	do do

EXPERIMENTS WITH MANGELS.

Thirteen varieties of mangels were tested. The soil was loamy and fairly uniform in quality, but all the varieties were not sown at the same time, because the seed was not on hand. Two sowings of each sort were made at an interval of fourteen days. Those sown last, have, in several cases, made as good a return as the earlier tests. This was probably owing to the dry summer, during which time none of the plots made much growth, and to the exceptionally favourable weather in autumn after copious rains had fallen, when all had an equal chance. Mangels, as a rule, give better yields when sown as early in spring as the land can be got into good condition. The mangels on all the plots were pulled on the 30th October. The yields per acre have been estimated from the product of two rows, each 66 feet long.

MANGELS—Test of varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	Yield per Acre.								Description of Variety.	
			1st Plot.		1st Plot.		2nd Plot		2nd Plot			
			Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.		
Mammoth Long Red (Webb).....	May 28.	May 4.	32	416	1073	36	17	1200	586	40	Long red.	
Red Fleshed Globe.....	April 27.	do	11.	31	832	1047	12	16	1792	563	12	Round red.
Canadian Giant.....	May 20.	June 3.	27	1440	924	..	25	1216	853	36	Long red.	
Golden Tankard.....	April 27.	May 11.	26	1856	897	36	21	240	704	..	Oblong yellow.	
Gate Post.....	do 27.	do	11.	26	800	880	..	21	416	706	56	Long red.
Red Fleshed Tankard.....	do 27.	do	11.	26	800	880	..	26	624	877	4	Oblong red.
Mammoth Long Red, (Evans)....	May 4.	do	18.	24	643	810	32	18	960	616	..	Long red.
Champion Yellow Globe.....	April 27.	do	11.	23	1520	792	..	21	1296	721	36	Yellow globe.
Warden Orange Globe.....	do 27.	do	11.	22	1408	756	48	27	560	909	20	Orange globe.
Giant Yellow Intermediate.....	do 27.	do	11.	22	192	736	32	28	320	938	40	Yellow globe.
Conqueror Yellow Globe.....	May 14.	do	28.	21	768	712	48	15	1680	528	..	Yellow globe.
Yellow Fleshed Tankard.....	do 28.	June 11.	18	1960	632	40	14	1920	498	40	Oblong yellow.	
Mammoth Long Red (Sharpe)....	do 14.	May 28.	15	1856	530	56	20	1516	691	56	Long red.	

EXPERIMENTS WITH CARROTS.

Ten varieties of carrots were tested. Two sowings of each sort were made at an interval of fourteen days. The land selected for these plots had been summer-fallowed in 1894 and manured with barn-yard manure. The soil was sandy loam. The yield has been a very fair one, but no doubt it would have been heavier but for the drought during summer. The yield has been calculated from the crop of one row 66 feet long. The seed was sown in flat drills 18 inches apart, and the plants thinned to about four inches in the row. The plots were not all sown at the same time, for the reason that the seed was not all received at the time of the first sowing. All were pulled on the 28th of October.

CARROTS—Test of Varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
			Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth White Intermediate.....	April 27..	May 11..	30	720	1,012		23	347	772	27
Improved Short White.....	do 27..	do 11..	25	160	836		14	226	470	26
Early Gem.....	do 27..	do 11..	19	1,848	664	8	21	827	713	47
Giant Short White Vosges.....	do 27..	do 11..	19	1,600	660		17	613	576	53
Carter's Orange Giant.....	May 4.	do 18..	19	720	645	20	13	1,867	464	27
Long Scarlet Altringham.....	April 27..	do 11..	18	961	616	1	15	1,213	520	13
Improved Half Long White.....	do 27..	do 11..	17	1,787	596	27	14	1,333	488	53
Long Orange or Surrey.....	do 27..	do 11..	17	1,787	596	27	12	1,813	430	13
Yellow Intermediate.....	May 14..	do 28..	15	680	528		11	880	381	21
Iverson's Champion.....	do 14..	do 28..	8	1,600	293	20	9	1,947	332	27

EXPERIMENTS WITH SUGAR BEETS.

Five varieties of sugar beets were tested. Two sowings each were made, the land chosen being alongside of the mangels and similar in character and quality. The first sowing was made on the 20th of May, the second on the 3rd of June, in rows 18 inches apart, and both were pulled on the 31st of October. The French White is the best for a feeding crop, as it yields the most, and being smoother at the bottom than any of the others, is more easily harvested. The yield has been calculated from the product of two rows, each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
French White.....	21	240	704	..	14	160	469	20
German White.....	20	128	668	48	15	1,680	528	..
Austrian Electoral.....	17	848	580	48	13	400	460	..
Vilmorin's Improved.....	15	1,680	528	..	15	900	515	..
Klein Wanzleben.....	13	400	460	..	13	1,456	477	36

TOTAL YIELD OF FIELD ROOTS FOR 1895.

Variety.	Tons.		Lbs.		Bushels.		Lbs.	
Turnips.....	48		1,830		1,630		30	
Mangels.....	11		1,830		397		10	
Carrots, field.....	8		410		273		30	
Sugar beets.....	3		1,890		131		30	
Total.....	72		1,960		2,432		40	

EXPERIMENTS WITH POTATOES.

Seventy-one varieties of potatoes were planted in warm sandy loam, and as there was very little rain from the time of planting until the earlier varieties were matured, the yield was affected somewhat. There was no scab, and only one variety showed any rot, this was the variety known as "State of Maine," and about five per cent only of these were affected. The potatoes were all planted from the 21st to 25th of May and dug from the 9th to 14th of October.

Seedlings—Nos. 3, 5, 7, 23 and 25 were planted in this test. No. 7 yielded well, is at the head of the list, and is very fair in quality. This is probably the only one of the five varieties worthy of further test.

POTATOES—Test of varieties.

Name of Variety.	Charac- ter of Growth.	When Matur- ed.	Average Size.	Quality.	Total Yield per Acre		Yield per Acre of Market- able.		Yield per Acre of Unmarket- able.		Form and Colour.
					Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Seedling No. 7.....	Strong..	Oct. 2	Large..	Fair...	327	4	268	29	58	35	Long, red.
Delaware.....	"..	Sept. 18	"..	Good...	324	8	299	40	24	28	Long, white.
Beauty of Hebron....	"..	Oct. 4	"..	Fair...	294	52	261	14	33	38	Oblong, pink.
Dakota Red.....	"..	" 4	"..	Good...	293	42	271	18	22	24	Round, red.
Carman's No. 1....	"..	Sept. 20	"..	"..	293	20	268	40	25	40	Round, white.
Chicago Market....	Medium	" 16	"..	"..	283	4	240	28	42	38	Oblong, pink.
Late Puritan.....	Strong..	" 28	Large..	"..	281	36	235	54	55	40	Long, white.
Earliest of All.....	"..	Aug. 28	"..	Fair...	281	36	232	9	49	27	Oval, pink.
Troy Seedling.....	"..	Sept. 13	"..	Good...	271	10	228	34	43	36	Round, white
Clay Rose.....	"..	" 4	"..	"..	264	60	213	..	51	..	Round, red.
Vanier.....	"..	" 28	"..	Fair...	246	24	202	49	43	35	Long, red.
Early White Prize....	"..	Aug. 18	"..	"..	244	34	186	..	58	34	Round, white.
Rural Blush.....	Medium	Oct. 1	"..	Good...	239	4	202	40	36	24	Round, pink.
Prize Taker.....	Strong..	Sept. 14	"..	"..	234	40	191	12	43	28	Round, red.
Orphans.....	"..	" 20	"..	Poor...	234	40	173	20	61	20	Long, white.
Daniels.....	"..	" 24	Medium	Fair...	227	20	187	35	39	45	Oblong, white.
Early Ohio.....	"..	" 4	"..	Good...	225	52	180	12	45	40	Oval, pink.
Daisy.....	"..	" 20	Large..	"..	220	..	178	35	41	25	Round.
Money-Maker.....	"..	" 11	"..	Poor...	220	..	171	30	48	30	Long, pink.
State of Maine.....	Medium	" 15	"..	Good...	208	16	168	28	29	22	Long, white.
American Giant.....	Strong..	" 14	"..	Medium	202	56	187	29	15	27	Long, white.
Peerless, Jr.....	Medium	" 14	"..	Good...	198	8	154	18	43	50	Round, white.
Empire State.....	Strong..	Sept. 16	Large..	Fair...	190	40	152	30	38	10	Long, white.
Early Gem.....	"..	" 6	"..	"..	190	40	148	30	42	10	Oval, pink.
London.....	"..	" 11	"..	"..	189	12	145	54	43	28	Long, pink.
Early Rose.....	Medium	" 8	Medium	Good...	187	34	156	51	30	43	Oblong, pink.
Thorburn.....	Strong..	Oct. 1	Large..	Fair...	183	20	164	50	18	30	Long, pink.
Early Harvest.....	Medium	Aug. 24	Medium	"..	183	20	110	40	73	20	Long, white.
Seedling No. 3.....	Strong..	Oct. 11	"..	Poor...	181	8	130	15	50	53	Long, red.
Maggie Murphy.....	"..	Sept. 20	Large..	Good...	178	56	144	26	34	30	

POTATOES—Test of varieties—*Concluded.*

Name of Variety.	Charac- ter of Growth.	When Matured	Average Size.	Quality.	Total Yield per Acre.	Yield per Acre of Market- able.	Yield per Acre of Unmarket- able.	Form and Colour.
					Bush lbs	Bush lbs	Bush. lbs.	
Pride of the Market . .	Medium	Sept. 20	Medium	Good . .	177 28	153 16	24 12	Flat, white.
Lee's Favourite	"	" 28	"	Fair . . .	176 ..	132 10	43 50	Long, pink.
Irish Daisy	Weak . .	" 10	Small . .	Poor . . .	176 ..	81 ..	95 ..	Round, white.
Harbinger	Strong . .	" 7	Large . .	"	173 4	157 ..	22 4	Round, pink.
New Variety No. 1 . . .	Medium	" 24	Medium	Good . .	173 4	138 4	35 ..	Round, white.
White Beauty	"	" 24	Small . .	Medium	173 4	123 37	50 27	Oval, white.
Lizzie's Pride	"	" 15	Medium	"	168 40	144 17	24 23	Oval, pink.
Stourbridge Glory . . .	Weak . .	" 28	Small . .	Poor . . .	167 32	66 48	100 44	Long, white.
Rochester Rose	Strong . .	" 14	Large . .	Good . . .	164 16	143 30	20 44	Round, pink.
Early Norther	"	" 20	Medium	"	164 16	131 25	32 25	Long, pink.
Victor No. 1	"	" 20	Large . .	Fair . . .	161 20	128 40	32 40	Long, red.
Pearce's Prize Winner .	"	" 20	"	Good . . .	158 24	136 43	21 41	Long, white.
Early Six Weeks	Medium	Aug. 22	Medium	"	156 56	113 36	43 20	Round, red.
Seedling No. 25	Strong . .	Oct. 4	"	Poor . . .	152 32	130 44	21 48	Long, white.
Northern Spy	"	Sept. 4	Large . .	Good . . .	152 32	129 48	22 44	Round, red.
Freeman	"	" 10	Medium	"	149 36	108 20	41 16	Round, white.
Clarke's No. 1	Medium	Sept. 20	Medium	Fair . . .	148 8	125 53	22 15	Long, pink.
Holborn Abundance . .	Strong . .	Oct. 6	"	Poor . . .	140 48	125 14	15 34	Long, white.
Great Divide	"	Sept. 24	Large . .	Fair . . .	140 48	107 ..	23 48	Round, white.
Early Sunrise	Medium	" 14	Medium	Good . . .	139 20	119 50	19 30	Oblong, pink.
Burpee's Extra Early .	Strong . .	" 2	Large . .	"	139 20	106 33	32 47	Long pink.
Pride of the Table . . .	Weak . .	" 15	Medium	"	133 28	112 40	20 48	Long, red.
Seedling No. 23	Strong . .	" 20	"	Fair . . .	132 ..	116 48	15 12	Oblong, purple.
Crown Jewel	"	" 28	Small . .	"	132 ..	103 22	28 38	Oval, pink.
New Queen	Medium	" 16	Medium	"	129 4	107 30	21 34	Long, red.
I. X. I.	Strong . .	" 20	"	Poor . . .	124 40	99 44	24 56	Long, pink.
Record	Weak . .	" 22	Small . .	"	120 16	48 45	71 31	Long, white.
Lightning Express . . .	Medium	" 6	Medium	Fair . . .	117 30	96 40	20 50	Round, red.
Early Puritan	"	Aug. 30	"	"	117 20	95 35	21 45	Long, white.
Ideal	Weak . .	Sept. 25	"	Poor . . .	117 20	85 40	31 40	Long, red.
Sharpe's Seedling	Strong . .	" 2	"	Fair . . .	102 40	88 15	14 25	Long, pink.
Pearce's Extra Early . .	Medium	Aug. 30	"	Good . . .	102 40	87 30	15 10	Long, pink.
Dreer's Standard	"	Sept. 9	"	"	102 40	78 35	24 5	Long, white.
Polaris	"	" 8	Small . .	Poor . . .	99 44	85 24	14 20	Long, white.
Seedling, 214	Weak . .	" 18	"	Fair . . .	95 20	68 40	26 40	Round, white.
Seedling No. 5	Strong . .	Oct. 10	"	Poor . . .	93 52	48 ..	45 52	"
American Wonder	"	Sept. 20	"	"	88 .	54 38	23 22	"
Monroe County	"	" 10	"	Fair . . .	73 20	65 35	7 45	Long, pink.
Everett	Weak . .	" 8	"	Poor . . .	73 20	61 50	11 30	"
Wonder of the World . .	"	" 2	"	"	52 48	43 30	9 18	Long, pink.

ORCHARD EXTENSION.

Since my last report about $7\frac{1}{2}$ acres have been added to the apple orchard and a number of additional varieties to the orchards of pears, plums, peaches and cherries.

Another orchard of about $3\frac{1}{2}$ acres has been planted on the mountain, at a height of about 1,050 feet—200 feet higher than the highest previously planted. The land was cleared of brush and standing timber, but not grubbed or cultivated. A hole was dug for each tree, leaving the remainder of the land in its natural state. A small circle about each tree has been kept loose and free from weeds and the remainder of the orchard mowed over twice during the summer, cutting down the second growth of brush. The expense for this was very trifling, and the trees have become well established. As the soil is a fine, warm loam, free from rocks or gravel, they will no doubt make a good showing in a year or two.

The older bench orchards, lower down on the mountain, have made a satisfactory growth, and the peaches and plums are coming into bearing.

The grapes, black and red raspberries, gooseberries, currants, peaches and plums that have fruited on the mountain have all ripened earlier than the same varieties planted on the level. The difference in time varies from four days in the plums to nearly two weeks in grapes, and the fruit was as large and fine as the same varieties on the valley land. Those on the mountain had no cultivation and but little care in preparing the land or keeping it in order. There are now very nearly 60 acres in all in large and small fruits on the Agassiz Experimental Farm.

APPLES.

The past season has been a fairly good one for apples. Old orchards as a rule did not give a heavy crop, but as spraying has been pretty generally practiced throughout the country, the apples have been fairer and of better quality than heretofore and young orchards have, where properly cared for, given a fairly good yield.

Spraying with the Bordeaux mixture has been of very great benefit on the experimental farm. Some varieties that were badly damaged by the fungus in previous years were almost entirely free from it this year, and the fruit was larger and handsomer and kept better. Some varieties appear to be much more difficult to protect than others. The Gravenstein seems to be one of this class. Some other sorts planted alongside and treated in every respect the same as regards spraying, were this year almost exempt from injury, while the Gravensteins were rather badly spotted both in leaf and fruit. There is, however, evidence of progress in checking the fungus even in this variety, for the fruit was larger and the growth of the trees stronger than last year, and the foliage was much cleaner and healthier.

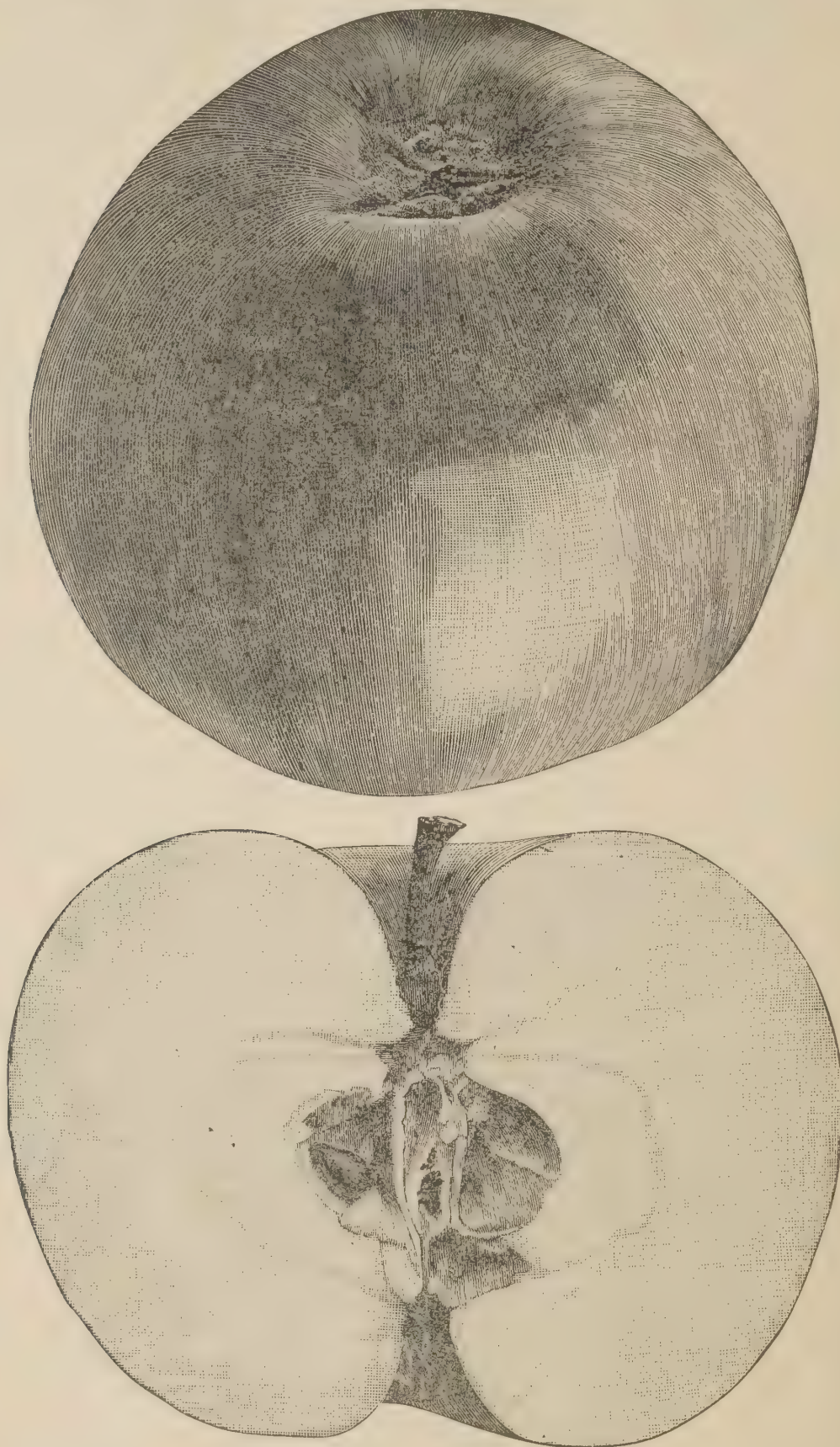
Ninety-three varieties of apples were shown in the Experimental Farm exhibit at the Victoria Agricultural Exhibition. A number of these were well known sorts, but many others were new to this district. Following will be found notes on those varieties which have fruited for several years and are considered to be of sufficient merit to warrant the recommending of them for more general planting.

CANADA BALDWIN—Tree a strong upright grower; fruit medium size; skin, greenish white with red stripes, and splashes on sunny side; flesh white, tender and juicy, mild sub-acid; season January and February.

CHENANGO STRAWBERRY—Tree a moderate spreading grower, very productive; fruit of medium size, oblong conical shape; skin yellowish white, shaded and splashed with crimson; flesh white, tender, juicy, mild sub-acid; very good; season latter part of August.

BELLE DE BOSKOOP—Tree a vigorous grower, spreading and productive; fruit above medium size, roundish; skin greenish yellow shaded with red over most of the surface, and slightly russeted; flesh white, crisp, tender juicy, sprightly sub-acid; season late fall and early winter.

BLENHEIM ORANGE—Tree a vigorous spreading grower, and fairly productive; fruit large, roundish; skin orange russet with a dark red cheek; flesh yellow, breaking, with a pleasant sub-acid flavour; very good; season last of October to December.



BLENHEIM ORANGE, NATURAL SIZE.

COOPER'S MARKET—Tree a vigorous spreading grower, and productive; fruit of medium size, oblate conic; skin yellowish white shaded with red; flesh white, tender, with a brisk sub-acid flavour; season winter.

COLVERT—Tree a strong spreading grower, and productive; fruit large, oblate, conic; skin greenish shaded with red in the sun; flesh greenish white, brisk sub-acid; a good cooking apple; season October to December.

EARLY HARVEST—Tree a strong, vigorous grower, and moderately productive; fruit of medium size, roundish; skin light yellow; flesh yellow, tender, juicy and crisp, rich flavour, sub-acid; season last of August.

EARLY STRAWBERRY—Tree a moderate and upright grower, moderately productive; fruit small to medium; skin yellowish white, nearly covered with red; flesh white with a tinge of red next the skin, tender, brisk, sub-acid with a pleasant aroma; season last of August and first of September.

GRIMES' GOLDEN—Tree a moderate and spreading grower, and very productive; fruit oblong and slightly conical; skin a greenish russet-yellow with small grey dots; flesh yellow, tender, crisp, juicy, with a spicy, aromatic flavour sub-acid; one of the best; season December to March.

HURLBUT—Tree a vigorous grower, and productive; fruit about medium size, oblate, slightly conic; skin greenish yellow, shaded with dark red; flesh white, crisp, tender, juicy, mild, sprightly sub-acid flavour; good; November and December.

HAWLEY—Tree a vigorous, upright grower and productive; fruit large, roundish, oblate conic; flesh whitish, tender, juicy, sub-acid rich with a mild but pleasant flavour; season September.

JERSEY SWEET—Tree a moderate, spreading grower, and a regular bearer; fruit of medium size, roundish; skin greenish, with light red nearly over the whole surface; flesh tender juicy, sweet, with a pleasant flavour; good both for dessert and cooking; season last of August to November.

JONATHAN—Tree a moderate grower and a regular and free bearer; fruit small to medium; skin greenish with red over nearly the whole surface; flesh white, tender, juicy, sub-acid with a very pleasant vinous flavour; too small for a profitable market apple, but one of the best dessert apples; season from December to last of March.

KESWICK CODLIN—Tree a moderate but spreading grower, and a very regular and abundant bearer; fruit above medium size, conical; skin greenish yellow; flesh yellowish white rather acid with a pleasant flavour, one of the best cooking apples; season August and September.

McMAHANS WHITE—Tree a strong and spreading grower, and an early and regular bearer; fruit large, round, obovate; skin white with a faint blush; flesh white, fine grained, acid, crisp and tender, very good for cooking; season December and January.

RIBSTON PIPPIN—Tree a vigorous spreading grower and a regular bearer; fruit above medium size, round; skin greenish yellow, mixed with russet and dull red on the sunny side; flesh yellow, firm and crisp mildly acid, with a rich aromatic flavour, very good; season December to March.

ST. LAWRENCE—Tree a vigorous and upright grower; fruit large, oblate in form; skin greenish yellow, striped and splashed with dull red; flesh white, crisp, tender, juicy, with a pleasant vinous flavour; season October and November.

SALOME—Tree a strong grower and productive; fruit of medium size, roundish, conical; skin reddish yellow with dark red over nearly the whole surface; flesh whitish yellow, juicy, tender, mild, sub-acid; season January to March.

SWEET BOUGH—Tree a very vigorous spreading grower and productive; fruit large to very large; skin smooth, yellow; flesh tender, juicy, rich and sweet with a pleasant flavour; season last of August and first of September.

SUTTON BEAUTY—Tree an upright, vigorous grower and productive; fruit above medium size and very uniform; in form roundish, oblate, conical; skin pale yellow splashed with crimson; flesh whitish, juicy, pleasant, sub-acid; season December and January.

WELLINGTON—Tree a strong, vigorous, spreading grower and very productive; fruit medium to large; form roundish; skin yellow with a blush; flesh yellow, crisp, tender, brisk acid, perfumed, a very fine kitchen apple; season January and February.

WOLF RIVER—Tree a strong spreading grower; fruit large to very large; form roundish oblate; skin greenish yellow with a considerable proportion of red; flesh white, coarse, juicy, mildly acid; season October and November.

WINTER ST. LAWRENCE—Tree a vigorous grower; fruit large, oblong, slightly conic; skin greenish yellow striped and splashed with red; flesh white, crisp, tender, of a mild and pleasant flavour, sub-acid; season December to February.

WARNER'S KING—Tree a vigorous, upright and spreading grower; fruit very large; form roundish ovate; skin deep yellow with a few greyish dots, and sometimes a slight blush; flesh white, tender and juicy, a very fine cooking apple; Tree productive and the fruit does not drop readily from the tree.

STARK—Tree a very vigorous grower, and productive; fruit large, oblong, inclining to conic; skin green, covered with dark red or nearly purple; flesh yellowish, juicy, mild sub-acid; season, January to April.

The following varieties have been added to the collection this year.

Roberson, Owen Jones, Earle, Celestia, Autumn Bough, Black Annette, Broadwell Sweet, Coffelt, Cook's Seedling, Cooper's Early White, Cullen's Keeper, Dr. Walker, Early Colton, Early Ripe, Indian, Kinnairds Choice, Lady Sweet, Marshall Red, Masons Orange, Nansemond Beauty, Pa. Red Streak, Osceola, Poorhouse, Primate, Rainbow, Romanite, Little Red Romanite, North Carolina Limbertwig, Early Joe, Yates Winter, Moscow, Springdale, September, Aikin, Colton, Chickasaw, Golden Beauty, Clyman Pippin, Red Winter Sweet, Calville Rouge Royal, Calville Rouge, Calville Blanc, Calville St Sauveur, Cadeau de Général, De Chataignier, Doux d'Argent, Perle d'Angleterre, Pomme d'Eve, Reinette de Caux, Rambourg d'Hiver, Reinette Franche, Reinette Franche Gris, Reinette de Lettre, Reinette d'Angleterre, Rallay d'Hiver, Rambourg d'Eté.

Fifty-six varieties, making now nearly six hundred in the collection of apples.

PEARS.

The pear trees have made a healthy growth and nearly all varieties that have been planted over two years blossomed, but only a few produced fruit, in previous years the leaves of many of the pear trees had been infested with the pear leaf mite, and many washes had been tried on a small scale to kill the pest, but without much apparent benefit. This year the trees were carefully sprayed with a mixture of lime, sulphur and salt, with very satisfactory results.

This mixture is made as follows:

Lime 30 lbs., sulphur 20 lbs., salt 15 lbs. Put all the sulphur, 10 lbs. of the lime and 20 gallons water in a boiler, and boil briskly for two hours, place the remainder of the lime in a barrel or other vessel and slack thoroughly, add the salt and dissolve; then add this to the sulphur and boil all together for a half hour longer; then add enough water to make 60 gallons, spray, in spring before growth begins, using the liquid luke warm.

The foliage on trees treated with this mixture was almost entirely free from the pest. This insect appears to be very generally distributed, for nearly all the pear trees received this season as in former years had more or less of the insect in the leaves. Since the foliage has become clean, the growth has been much stronger than formerly.

The following varieties have fruited during the past season:

DOYENNE D'ETE—Ripe July 18th, fruit small, roundish, skin yellow with a blush, flesh white, sweet, juicy and of very pleasant flavour, tree a moderately vigorous grower, productive.

MADELAINE—Ripe July 28th; fruit of medium size, smooth and handsome; skin pale yellow; flesh yellow, sweet, juicy and of fine flavour; tree a vigorous grower.

DEARBORN'S SEEDLING.—Ripe August 10th; fruit small, roundish; skin, smooth, bright yellow with a few small dots; flesh white, very juicy, melting and sweet, very good; tree a strong compact grower, productive.

MARGARET or PETITE MARGUERITE.—Ripe August 15th; fruit of medium size; skin greenish yellow with a reddish cheek, and many greenish dots; flesh white, buttery, juicy and sweet perfumed; tree a moderately strong grower and productive.

SUMMER BELLE.—Ripe last of August; fruit large, bell shaped; skin yellowish green; flesh white, soft and juicy, slightly astringent, of poor quality; tree a very stout and healthy grower, fairly productive.

DULA MEDVIEDEVKA.—Ripe August 13th; fruit of medium size; skin green with a shading of yellow; flesh white, juicy, sprightly with a pleasant vinous flavour; tree a very vigorous healthy grower. This is the second year this variety has fruited and it promises to be productive and of considerable value.

GLIVA KURSKAYA.—Ripe August 28th; fruit medium size; skin golden russet; flesh yellowish color, juicy, melting, sprightly and very pleasant; flavour good; tree a strong vigorous grower.

BESSEMIANKA.—Ripe September 10th; fruit above medium, very regular and even in size; skin a russet yellow with a reddish cheek; handsome, of poor quality, only fit for cooking; tree an upright vigorous grower, and promises to be very productive.

SAPIEGANKA.—Ripe September 10th; fruit medium size; skin green; flesh greenish white, juicy, but of poor quality, slightly acid; the tree makes a strong and vigorous growth.

SOUVENIR DE CONGRESS.—Ripe September 15th; fruit very large; shaped like the Bartlett; skin yellow with a bright red blush; flesh juicy, sweet and of very pleasant flavour; tree a vigorous and upright grower.

HOWELL.—Ripe in October and keeps till November; fruit above medium size, very regular and even; skin golden yellow; flesh white, juicy and of a brisk, pleasant flavour; tree a vigorous upright grower and productive.

LE CONTE.—Ripe last of September; fruit medium size, bell shaped; skin a pale yellow, a handsome cooking pear; tree a vigorous and upright grower and productive.

The following pears produced a few specimens each, which were placed in the collection for exhibitions and were spoiled before an opportunity occurred for testing their quality.

MT. VERNON.—Fruit of medium size, roundish; skin light yellowish russet with a dull red blush.

LAWRENCE.—Fruit of medium size, obtuse pyriform; skin pale yellow with brown dots.

TYSON.—Fruit small, acute pyriform, dull russet with a bright red cheek.

SHELDON.—Fruit above medium size, roundish obtuse obovate; skin, yellowish green.

DEMPSEY.—Fruit large, shaped very like Bartlett. Tree a vigorous upright grower.

DR. JULES' GUYOT.—Fruit large, shaped like Bartlett. Skin smooth, yellow, with a little blush. Tree vigorous.

DURONDEAU.—Fruit large, skin russet yellow, with a reddish cheek. Tree vigorous.

PRINCESS (Rivers).—Above medium size, pyriform, skin green. Tree a strong upright grower.

GOODALE.—Fruit above medium size, oblong, pyriform, skin russet yellow, with a red cheek. Tree a very moderate grower.

BEURRE DE CAPIAUMONT.—Fruit of medium size, quite long and tapering to the stem. Tree a strong spreading grower.

THOMPSON.—Fruit of medium size, pyriform. Skin greenish yellow. Tree vigorous.

KNIGHT'S MONARCH.—Fruit small medium, roundish. Skin green with russet dots. Tree vigorous.

BEURRE BROWN.—Fruit above medium size, oblong. Skin greenish yellow, with a slight reddish blush. Tree a moderate spreading grower.

The following well-known varieties fruited:—

Bartlett, Anjou, Angouleme, Clairgeau, Seckel, Winter Nelis, Keiffer, Clapp's Favourite, Vicar of Winkfield, and Louise Bonne de Jersey.

The Williams Bonchretien (or Bartlett) brought from England in the spring of '93 fruited this year. There is no difference in appearance of tree or fruit between it and the Bartlett planted in the spring of 1890.

The following varieties of pears have been added this season :—

La Belle Ruth, Winter Bartlett, Sutton's Great Britain, Victor, Figue d'Alençon, Beurre d'Angleterre, Beau Present Espargne, La France, Soldat Laboureur, Brockworth Park, Bonne d'Ezée, Augustus Dana, Louis Vilmorin, Beurre Gris d'Hiver, Zoe, Forelle and Marshall Vaillant.

PLUMS.

The plum crop has been a very fine one this year, it is one of the most satisfactory as well as profitable fruits to grow west of the Cascades. The climate and soil appear to suit this fruit admirably, and it very seldom fails to yield a fair crop and generally a heavy one, and if picked in season the plums will bear shipping to considerable distances. Forty varieties fruited with us this year.

The following is the order of ripening with notes on those considered most desirable to plant, either for home consumption or for market :—

DRAP D'OR.—Ripe 26th July. Fruit below medium size; skin yellow with reddish specks. Flesh yellow, sugary, rich and pleasant. Tree very productive.

SAUNDERS.—Ripe 2nd August. Fruit above medium size. Bright yellow; flesh juicy, and of fair quality. One of the best for preserving. Tree a close upright grower, vigorous and productive.

PEACH.—Ripe 6th August. Fruit large; red flesh, rather coarse. Tree not very productive.

NIAGARA.—Ripe August 13th. Fruit large to very large, reddish purple; flesh a little coarse, sweet, juicy and pleasant. Tree an upright strong grower, productive.

BRADSHAW.—Ripe August 22nd. Fruit large reddish purple, with a blue bloom; flesh juicy, pleasant and good. Tree a strong upright grower, productive.

VICTORIA.—Ripe August 22nd. Fruit large, pale red, of fine flavour and good quality. Tree a spreading grower, very productive.

WASHINGTON.—Ripe August 24th. Fruit large, yellow with blush, very handsome; flesh sweet and juicy. Tree a strong grower and very productive. Trees planted in the spring of 1890 averaged this year 200 pounds each of merchantable fruit.

LARGE GOLDEN PROLIFIC.—Ripe August 22nd. Fruit above medium size, golden yellow, flesh juicy, sweet and of pleasant flavour. Tree a vigorous grower, moderately productive.

COLUMBIA.—Ripe August 22nd. Fruit very large, round, dark purple with lighter coloured dots; flesh yellow, coarse, sweet and of good quality. Tree a vigorous grower and productive.

JEFFERSON.—Ripe August 20th. Fruit of medium size or above medium, yellow with a whitish bloom, flesh deep yellow, juicy, rich and of very fine quality. Tree a vigorous grower and productive, one of the best for dessert.

AMERICAN VIOLET.—Ripe August 24th. Fruit large, light purple with a bluish bloom, round, flattened at the end; flesh yellowish, sweet, juicy, and of very fine flavour. Tree a strong grower and productive, an excellent shipper.

HUDSON RIVER PURPLE EGG.—Ripe 24th Aug. Fruit large, oval, skin deep purple with a blue bloom; flesh juicy, sweet, with a very pleasant flavour. Tree a vigorous grower and productive. Plum a very fine shipper.

IMPERIAL GAGE.—Ripe 21st Aug. Fruit of medium size, greenish yellow, with a white bloom; flesh greenish, juicy, sweet, and melting with a rich flavour; tree a vigorous grower, very productive.

MOORE'S ARCTIC.—Ripe 25th Aug. Fruit of medium size; skin nearly black with a heavy blue bloom; flesh greenish yellow, sweet and juicy; tree a moderate grower, productive.

SMITH'S ORLEANS.—Ripe 23rd Aug. Fruit above medium size, oval; skin dark purple, with a blue bloom; flesh yellow, juicy, firm with a sprightly pleasant flavour; an excellent plum for dessert and a good shipper; tree a strong grower and very productive.

SHIPPER'S PRIDE.—Ripe 24th Aug. Fruit above medium size; skin purple with a light blue bloom; flesh yellow, sweet and juicy, of fair quality, a good shipper; tree a strong upright grower and productive.

MOYER.—Ripe 24th Aug. Fruit small to medium; reddish purple, with a light blue bloom; flesh yellow, sweet, juicy and good, a good shipper; tree a fair grower, and very productive.

REINE CLAUDE.—Ripe 26th Aug. Fruit small, round, green with a yellowish tinge; flesh yellow sweet, juicy with a rich pleasant flavour; tree a moderate grower and moderate bearer.

SUGAR PLUM.—Ripe 28th Aug. Fruit small, nearly black; flesh rich sweet and of pleasant flavour; tree a vigorous upright grower but not productive.

GUEII.—Ripe 1st Sept. Fruit large, oval; skin deep purple, with a blue bloom; flesh yellow, firm, juicy and sweet; a good shipper; tree vigorous, and a regular and heavy bearer.

LOMBARD.—Ripe 1st Sept. Fruit reddish purple, above medium in size. Flesh yellow, juicy and pleasant. Tree a vigorous grower and a heavy bearer, fruit liable to fall off unless thinned.

PETERS' YELLOW GAGE.—Ripe 2nd Sept. Fruit of medium size, round, skin pale yellow, with a thin light bloom. Flesh yellowish, juicy, sweet. Tree a moderate grower, but not a free producer.

BITTERN.—Ripe 4th Sept., fruit above medium size, very similar in appearance to Gueii, skin reddish purple with a thick blue bloom; flesh yellow, sweet juicy, firm, and promises to be a good shipper.

SARATOGA.—Ripe 4th Sept. Fruit of medium size, roundish oval; skin reddish purple with a light bluish bloom; flesh yellow, juicy, sweet and pleasant. Tree a strong grower.

DUANE'S PURPLE.—Ripe 4th Sept. Fruit of medium size, oval; skin, pale reddish purple, covered with a bluish bloom; flesh semi-transparent yellow, juicy, moderately sweet, with a pleasant flavour. Tree a vigorous grower and very productive.

GENERAL HAND.—Ripe 4th Sept. Fruit large, golden yellow; flesh pale yellow, juicy sweet, and of a pleasant flavour; tree a very strong grower and moderately productive.

ITALIAN PRUNE.—Ripe 5th Sept. Fruit of medium size, oval; skin dark blue and covered with a blue bloom, flesh yellow, juicy, sweet and rich; tree a moderate grower and productive.

COE'S GOLDEN DROP.—Ripe 5th Sept. Fruit large to very large, oval; skin pale yellow; flesh yellow, sweet and very good; tree a fair grower and productive.

MONROE.—Ripe 5th Sept. Fruit below medium size, of fair quality, but too small for profitable cultivation; tree a vigorous grower and productive.

CLUSTER DAMSON.—Ripe 6th Sept. Fruit oval, nearly 1 inch long, dark blue or nearly black with a thick blue bloom; tree a vigorous grower and very productive.

KING OF DAMSONS. Ripe 6th Sept. A little larger than the Cluster, but very similar to that variety.

DAMSON.—Ripe 6th Sept. Fruit very similar to Cluster Damson, but not so productive as either Cluster or King.

BLEEKER'S GAGE.—Ripe 6th Sept. Fruit of medium size, roundish, oval; skin yellow with whitish specks, and a thin bloom; flesh yellow, sweet, juicy, very rich and pleasant; tree a vigorous grower and productive.

POND'S SEEDLING.—Ripe 6th Sept. Fruit very large, oval, tapering to the stalk; skin pale red, with a thin bloom; flesh yellowish, coarse, juicy and sweet; tree a vigorous grower and moderately productive.

RED EGG.—Ripe 6th Sept. Fruit above medium size, oval; skin reddish purple, with a bluish white bloom; flesh yellowish green, juicy, rather coarse, slightly acid; tree a vigorous upright grower and productive.

YELLOW EGG.—Ripe 8th Sept. Fruit very large, oval, tapering towards the stalk; skin yellow; flesh juicy, coarse, and not high flavoured; tree a fair grower and moderately productive.

PRUNE D'AGEN.—Ripe 9th Sept. Fruit small to medium, oval; skin purple, with a thick bloom; flesh greenish yellow, juicy, sweet, rich and very pleasant; tree a moderate grower and productive.

GERMAN PRUNE.—Ripe 9th Sept. Fruit long, oval; skin purple, with a thick, blue bloom; flesh greenish, sweet, firm and pleasant; tree a fair grower and productive.

PRUNUS SIMONI.—Ripe 12th Sept. Fruit above medium size, round, flattened at both ends, $1\frac{1}{4}$ inches deep by $1\frac{1}{2}$ to $2\frac{1}{4}$ in diameter; colour bright red; juicy with a rather disagreeable flavour; tree a slender upright grower, not productive.

The following 30 varieties have been added to the collection of plums during the past season:—

Ella, Seedling Peach, Wickson, Annie Spathe, World Beater, Gold, Missouri Green Gage, Stark Green Gage, Pooles Pride, Missouri Apricot, Ironclad, Yellow Japan, Caddow Chief, White Honey (damson), Hughes Late, Roulette, Reine de Mirabelle, St. Catherine, President Courcelles, Reine Claude Transparent, Reine Claude Verte, Monsieur Jeune, Petite Mirabelle, Reine Claude Bazaimbaud, Blood plum of Satsuma, Paymore d'été Prune, Tibbets Plum, Golden Prune, Evans Seedling, Satsuma, Normands Yellow, Barbat d'Ente (prune), Lot d'Ente (prune), Blake's Prune, Blue Diamond, Thompsons, Splendor.

CHERRIES.

The cherry trees have all made a healthy growth this year, and forty-one varieties of those planted in the years 1890-91 and 1892 fruited, also two of the trees received from France in the spring of this year.

ELTON.—Fruit large pointed, reddish yellow, flesh tender, juicy, and very pleasant. Ripe 24th June.

WILLAMETTE.—Fruit large, light red, pleasant juicy, sweet. Ripe 24th June.

BLACK HEART.—Fruit large, black, juicy, sweet, rich flavour. Ripe 24th June.

FLORENCE.—Fruit large, reddish colour, firm, sweet and juicy. Ripe 26th June.

EARLY RICHMOND.—Fruit of medium size, round, dark red, juicy, acid, Ripe 25th July.

PARENT.—Fruit below medium, round, dark red, firm, juicy, slightly acid. Ripe 27th June.

LOVE APPLE.—Fruit large, round, light red, tender, juicy, sweet. Ripe 27th June.

DYEHOUSE.—Fruit of medium size, deep red, juicy, pleasant acid. Ripe 27th June.

COE'S TRANSPARENT.—Fruit large, round, pale yellow, red in the sun, flesh juicy, sweet, very pleasant. Ripe 27th June.

CUMBERLAND.—Fruit large; yellow red, tender, juicy, sweet, pleasant flavour; ripe 28th June.

CHAMPAGNE.—Above medium size, bright red, juicy, sweet, firm, very pleasant flavour: ripe June 28th.

KNIGHT'S EARLY BLACK.—Large, black, tender, juicy. Ripe 28th June.

LIEB.—Fruit small, round, flesh tender, juicy, sweetish sub-acid. Ripe 30th June.

LOUIS PHILIPPE.—Fruit large, round, black red colour, flesh tender, juicy, mild acid; ripe 5th July.

BLACK TARTARIAN.—Fruit large, black, juicy very fine quality; ripe 5th July.

GOVERNOR WOOD.—Above medium size, reddish yellow colour, juicy, rich and sweet; ripe 5th July.

YELLOW SPANISH.—Fruit very large, yellow, firm, sweet and very good; ripe 4th July.

OSTHEIM.—Fruit medium size, dark red, flesh tender, juicy, mild sub-acid; ripe 6th July.

BESSARABIAN.—Fruit below medium, dark red colour, flesh tender, juicy, sub-acid; ripe 8th July.

LUTOVKA.—Fruit small, flesh firm, tender, juicy, sweet; ripe 8th July.

BELLE DE CHOISEY.—Medium size, yellow with a blush on sunny side, sweet, juicy, and very finely flavoured; ripe 9th July.

LUELLING.—Above medium size, very dark, flesh firm, juicy, very pleasant flavour, quality good; ripe 9th July.

BLACK EAGLE.—Large, nearly black, flesh tender, uicy and of very rich flavour; ripe 9th July.

EMPRESS EUGENIE.—Above medium size, deep red colour, flesh tender, rich and juicy, quality good; ripe 10th July.

DOWNER'S LATE RED.—Fruit large, light red, juicy, sweet and of very fine quality; ripe 10th July.

BLACK REPUBLIC.—Fruit large, colour black, flesh firm, dark red, sweet, highly flavoured, good; ripe 11th July.

WINDSOR.—Fruit large, dark purple, flesh firm, moderately juicy, of a rich flavour, one of the best; ripe 11th July.

MEZEL.—Fruit very large, nearly black, flesh firm, dark red, juicy, sweet and high flavoured; ripe 13th July.

MONTMORENCY.—Fruit of medium size, colour bright red, flesh tender, juicy, sub-acid and of good quality; ripe 15th July.

LATE DUKE.—Fruit large, light red colour; flesh juicy, sub-acid, of fair quality; ripe 16th July.

ROYAL AMERICAN.—Fruit very large, light red with darker red on sunny side, flesh firm yellowish white, juicy, high flavoured, quality very good; ripe 16th July.

NAPOLEON.—Fruit very large, colour deep yellow mottled with red, flesh very firm, juicy, sweet. In quality this is one of the best. Ripe 16th July.

LITHAU.—Below medium in size, round, dark red; flesh dark red, firm, juicy, sub-acid, quality good; ripe 17th July.

BELLE MAGNIFIQUE.—Fruit large, roundish, light red, juicy, firm, sub-acid good; ripe 20th July.

GREAT BIGARREAU.—Resembles Mezel, but did not ripen for a week later than that variety; ripe 20th July.

REINE HORTENSE.—Fruit large, bright red; flesh tender, juicy, firm and very good; ripe 20th July.

CENTENNIAL.—Fruit very large, pale red; flesh firm, tender, juicy, sweet and rich; very good; ripe 20th July.

ENGLISH MORELLO.—Medium size, dark red; juicy, acid; ripe 21st July.

CARNATION.—Fruit large, yellowish red; flesh tender, juicy, slightly acid; ripe 22nd July.

OLIVET.—Fruit large, deep red; flesh tender, juicy, sub-acid, good; ripe 24th July.

VLADIMIR.—Fruit medium size, round, pale red; flesh juicy, tender, sub-acid, slightly astringent; ripe 24th July.

DUCHESS DE PALLAU.—Fruit of medium size, round, flattened, deep red; flesh rather firm, juicy, slightly acid; ripe 28th July.

MONTMORENCY COURTE QUEUE.—Fruit large, round, flattened, bright red; flesh tender, juicy, pleasantly acid; ripe 30th July.

The following varieties have been received since my last report:—

Mercer, Deacon, Bing, Abbesse, Thompson's Black Tartarian, California Advance, Suda Hardy, Ida, Montmorency (large), Schmidts Bigarreau No. 2, De Planchoury, Duchesse de Pallau, Angleterre Tardive, Montmorency Courte Queue, Angleterre Hative, making 15 new varieties this year.

DWARF ROCKY MOUNTAIN CHERRY.

The Dwarf Rocky Mountain or Sand Cherry bushes produced a few cherries. The fruit varied in size, shape and quality, the size ranging from small to medium, and almost to large, and the shape from round flattened to oval; skin dark red to nearly black, flesh dark red, juicy, mildly acid. Ripe 15th August; hangs long on the bushes, until September 15th; not valuable where other cherries can be grown.

REMEDY FOR APHIDES ON FRUIT TREES.

A number of different mixtures have been tried for killing the woolly, green and black aphides so common and troublesome on fruit trees. The cheapest, most effective

and simplest remedy we have tried is tobacco water. One pound of cigar makers refuse will make six gallons of mixture. This has never failed in our experience, when properly and thoroughly applied by spraying all parts of the tree. As it is harmless to the foliage, it is not necessary to be exact as to the strength of the wash, and four or five pounds of stems and waste, left to soak in a barrel of water for 24 hours, makes an effective and safe preparation.

PEACHES.

A large number of the peach trees blossomed this year, but those that bloomed earliest did not set fruit, and the crop was a very light one on those that did bear. They were sprayed with Bordeaux mixture before leafing out, and again when the leaves were nearly full grown; and those sprayed had very little curl leaf. A few trees of several varieties were left unsprayed, and the leaves were nearly all destroyed with the curl, and the trees made a very feeble growth, while those which had been sprayed made a very strong and healthy growth. The following varieties fruited:

AMSDEN.—Grown on bench. Fruit medium size, very handsome, and of very fine quality. Ripe 31st July.

HILBORN.—Grown on bench. Fruit medium size, and of very fine flavour. Ripe first week in August.

ALEXANDER.—Grown on bench. Fruit medium size, of very fine quality. Ripe first week in August.

EARLY BARNARD.—Grown on bench. Above medium size, and of good quality. Ripe early in August.

MOUNTAIN ROSE.—Grown on bench. Fruit small to medium in size; of very fine flavour. Ripe early in August.

GOLDEN CLING.—Grown on level. Fruit above medium size, very handsome, and of good quality. Ripe middle of August.

REID'S EARLY GOLDEN.—Grown on level. Fruit above medium size, very handsome, and of good quality. Ripe last of August.

FOSTER.—Grown both in valley and on bench. Fruit large, very handsome, and of very fine flavour. Ripe, on the bench, last of August; on the level, in September.

EARLY SILVER.—Grown on level. Fruit large, very handsome, and of fair quality. Ripe early in September.

PRINCESS OF WALES.—Grown on level. Fruit of medium size, and fair quality. Ripe early in September.

EARLY YORK.—Grown on level. Fruit above medium size, very handsome, and of fine quality. Ripe early in September.

EARLY CRAWFORD.—Grown on level. Fruit large, handsome, and of good quality. Ripe early in September.

LEMON.—Grown on level. Fruit above medium. Too late; did not ripen.

Several other varieties produced one or two peaches.

The following varieties have been added this year to the collection, either as trees or scions for budding:—Heath, Washington, Peninsula Yellow, Red River, Summer Snow, Northern Apricot, Poole's Large Yellow, Rouge de Mai, Madeline de Courson, Brandywine, Dr. Pilkington, Lone Star, Princess Royal, Pride of Idaho, Higgins' Seedling, Phillips, Crimson Beauty, and two unnamed British Columbia seedlings, said to be of considerable merit; making nineteen varieties added to the list in 1895.

NECTARINES.

A number of the nectarine trees blossomed this year, but none fruited. The blossoms fell off before the fruit formed. Two applications of Bordeaux mixture, as in the case of the peaches, prevented the curl leaf, and the trees have made a strong, healthy growth. Scions of the following varieties were received from Mr. Charles E. Shinn, B. A., of California Agricultural College:—Advance, Humboldt, Alsopp's Late, and De Coulange. Two of these were in the collection before.

APRICOTS.

None of the apricots fruited freely. The following varieties produced each a few specimens :—

SHENSE.—Fruit large, $2 \times 1\frac{3}{4}$ inches ; very handsome, and of fine quality. Ripe 22nd July.

ALBERGE DE MONTGAMET.—Medium size, fair quality. Ripe early in August.

BREDA.—Fruit small, handsome, and of good quality. Ripe first week in August.

CANINO GROSSO.—Above medium size, and of good quality. Ripe early in August.

ALEXANDER.—Fruit small, juicy, rich in flavour, and of good quality. Ripe early in August.

GIBB.—Fruit small, flesh tough and stringy, of a pleasant flavour, and fair quality. Ripe last of July.

J. L. BUDD.—Fruit small, rich, sweet, of a pleasant flavour, good. Ripe last of July.

CATHERINE.—Fruit small, pleasant flavour, quality good. Ripe last of July.

Alexander, Gibb, J. L. Budd, and Catherine are very similar in size, appearance, and quality. The Shense is the best of those which have fruited.

Apricots received in 1895 :—Briggs' White, Allen's Seedling, Brigetti's French, Kaisha, Blenheim, Hemskirk, Noonday, Sunrise, Luizette.

MULBERRIES.

The mulberries all fruited this year, and some of the trees had a fair crop. The berries vary in size, in the different varieties, from $\frac{3}{4}$ to $1\frac{1}{8}$ inch long by $\frac{1}{4}$ to $\frac{1}{2}$ inch at the greatest diameter. The fruit is sweet, juicy and pleasant, but without much flavour, and falls from the trees when fully ripe. Downing's Everbearing has the largest fruit.

QUINCES.

Several of the quince bushes blossomed, but have not borne fruit. The growth is strong and healthy.

FIGS.

The figs have made a strong growth, but only one variety—the Early Violet—bore fruit. Several figs formed, and grew to be as large as walnuts, but dropped off before ripening.

MEDLARS.

Two more varieties of medlars were received from France last spring ; these have made a vigorous, healthy growth. There are now three varieties of this fruit in the collection : the Royal, Nottingham, and Dutch.

FILBERTS.

All the varieties of filberts mentioned in my previous reports have fruited again this year. They were very small bushes when received in the spring of 1890, and have been transplanted once since that time, but they have made a strong growth each year, and have borne fruit for the last four years. They have not been injured as yet by insect or fungous enemies, and I have no doubt that they would do as well planted on rough mountain slopes, wherever there is plenty of soil. The nuts are large, well-filled and sweet. The only enemy a planter would have in planting bench lands, would be

squirrels. The following seven additional varieties were received this fall, and will be planted in the spring, bringing the collection up to fourteen varieties :—

Corylus avellana,	Aveline anglaise.
do	Coque tendre.
do	Merveille de B. Willer.
do	Fertile d'Angers.
do	Peticule rouge.
do	purpurea.
do	pendula.

GRAPES.

Over sixty varieties of grapes fruited this year. The season was very favourable for grapes. August was warm with almost continuous sunshine; September was showery but warm, and October was a very fine, warm, sunny month, days bright and clear and the nights warm. Where the same varieties have been planted in the vineyard, on the level land, and on the mountain, those on the mountain ripened from 12 to 20 days earlier than those on the level. The following varieties ripened before the frost came :—

White or nearly White.

JESSICA.—Ripe on bench, 15th Sept. ; in vineyard, 2nd Oct.
 NIAGARA.—Ripe on bench, 30th Sept. ; in vineyard, 15th Oct.
 SAUNDERS' SEEDLING No. 1.—Ripe on bench, 18th Sept. ; in vineyard, 10th Oct.
 ELVIRA.—Ripe on bench, 5th Oct. ; in vineyard, 24th Oct.
 EMPIRE STATE.—Ripe in vineyard, 24th Oct.
 LADY.—Ripe on bench, 25th Oct. ; in vineyard, did not fully ripen.
 POCKLINGTON.—Ripe on bench, 30th Oct. ; not ripe in vineyard.

Black.

BACCHUS.—Ripe on bench, 4th Oct. ; in vineyard, 28th Oct.
 HARTFORD.—Ripe in vineyard, 12th Oct.
 MOORE'S EARLY.—Ripe in vineyard, 22nd Oct.
 CONCORD.—Ripe in vineyard, 15th Oct.
 HERBERT.—Ripe in vineyard, 25th Oct.
 WORDEN.—Ripe in vineyard, Oct. 28.

Red.

DELAWARE.—Ripe on bench, 2nd Oct. ; in vineyard, 16th Oct.
 AMBER QUEEN.—Ripe in vineyard, 10th Oct.
 SALEM.—Ripe in vineyard, 7th Oct.
 LINDLEY.—Ripe in vineyard, 20th Oct.
 VERGENNES.—Ripe in vineyard, 20th Oct.

Martha, Catawba, Wilder, Massasoit, August Giant, Rogers 28, Early Victor, Naomi, Agawam, Rogers 14, Brighton, Rogers 39, Rogers 5, Florence, Arnold's 8, Secretary, Moyer, Eva, Noah, Cottage, Marion, Wyoming Red, Arnold's No. 1, Lady Washington, Cynthiana, Improved Wild, Ulster, Rogers No. 19, Arnold's 2, Goethé, Ives' Seedling, Champion, Telegraph, Rogers 41, Emerald, Missouri Riessling, Eldorado, Rogers 24, Jefferson, Oriental, Clinton with Muscat, all produced fruit, and many were well coloured, but were not quite ripe when frost came.

BLACK CURRANTS.

The following varieties of black currants have fruited during the past season :—

LEE'S PROLIFIC.—Ripe 6th July ; stem long ; berry of medium size, but very uneven ; quality good.

BLACK NAPLES.—Ripe 4th July ; bunch medium ; berry of medium size ; quality good.

BLACK CHAMPION.—Ripe 10th July ; bunch long ; berry of medium size ; quality, fair.

OGDENS BLACK.—Ripe 9th July ; bunch long ; berry of medium size, sweet, and of very good flavour.

BALDWIN.—Ripe 5th July ; bunch medium ; berry above medium size and very even ; very fine flavour.

PRINCE OF WALES.—Ripe 6th July ; bunch extra long ; berry large and even, sweet, of very fine flavour ; one of the best.

CRANDALL.—Ripe 20th July ; only a few berries produced ; very uneven in size.

SAUNDERS' SEEDLING BLACK CURRANTS.

STEWART.—Ripe 25th June ; a feeble grower ; not productive ; bunch short ; berry small ; quality poor.

RULER.—A vigorous grower and productive ; ripe 25th June ; bunch short ; berry medium ; quality poor.

KENTVILLE.—A vigorous grower ; ripe 30th June ; bunch medium ; berry above medium size ; sweet and pleasant.

STIRLING.—A medium grower ; ripe 26th June ; berry small ; bunch long ; flavour good.

HENRY.—A medium grower ; ripe 26th June ; bunch short ; berry above medium, with a very mild and pleasant flavour.

OXFORD.—A strong grower ; ripe 27th June ; bunch long, but well filled out ; berry of medium size ; quality fair.

MIDDLESEX.—A vigorous grower and productive ; ripe 29th June ; berry small, but of good quality ; mild and sweet ; bunch long and well filled.

ETHEL.—A fair grower ; ripe 26th June ; berry large, mild and sweet ; bunch long and well filled.

PARKER.—A weak grower and not productive ; ripe, 28th June ; berry small and of a strong flavour ; bunch short.

CLIMAX.—A vigorous grower and productive ; ripe 27th June ; bunch long, berry large with a sweet and pleasant flavour.

ECLIPSE.—A strong grower and productive ; ripe 26th June ; bunch of medium length ; berry medium to large ; quality very good.

NORTON.—A strong grower, not productive ; ripe 27th June ; bunch short ; berry of medium size ; quality fair.

BELLA.—A moderate grower, not productive ; ripe 26th June ; bunch short ; berry small but of good flavour.

PEARCE.—Bush a moderate grower and productive ; ripe 26th June ; bunch long ; berry large and of very pleasant flavour, mild and sweet.

MONARCH.—A strong grower and productive ; ripe 26th June ; bunch long ; berry large and even ; flavour mild and pleasant.

LENNOX.—A vigorous grower and productive ; ripe 20th June ; bunch of medium length ; berry small ; quality fair.

DOMINION.—A moderate grower, productive ; ripe 26th June ; bunch long ; berry of medium size ; strong flavour and rather acid.

LEWIS.—A feeble grower, not productive ; ripe 27th June ; bunch of medium length ; berry, small and of poor quality.

SUCCESS.—A vigorous grower and productive ; ripe 28th June ; bunch of medium length ; berry of fair size, very sweet and pleasant.

LONDON.—A fair grower, productive; ripe 27th June; bunch of medium size; berry medium in size; quality good.

STAR.—A weak grower, not productive; ripe 29th June; bunch short; berry small; flavour mild and pleasant.

BEAUTY.—A medium grower, productive; ripe 25th June; bunch long; berry above medium size, mild and pleasant.

LANARK.—A weak grower, not productive; ripe 25th June; bunch short; berry small.

CHARMER.—A weak grower, not productive; ripe 26th June; bunch short; berry small; quality medium.

EAGLE.—A strong grower and productive; ripe 27th June; bunch long; berry medium to large; flavour good.

LOUISE.—A vigorous grower and productive; ripe 23rd June; bunch long; berry above medium size; quality good.

ONTARIO.—A strong grower and productive; ripe 27th June; bunch long; berry large, sweet, mild and pleasant.

WOOD.—A vigorous grower and productive; ripe 27th June; bunch long; berry of medium size; fine flavour but acid.

As none of these seedlings have fruited here before, it will be necessary to give them further trial before a correct estimate of their merits can be made. This has been an unfavourable year for them, as they are planted on a gravelly soil which suffered from the drought. Several of the varieties compared favourably in size, quality and productiveness, with the older varieties grown on heavier land.

RED CURRANTS.

Although the drought prevented the berries from attaining their full size, yet the crop of currants has been a very good one during the past season. The following varieties have fruited.

RABY CASTLE.—Ripe 28th June; bunch long; berry of medium size and good quality.

PRINCE ALBERT.—Ripe 29th June; bunch long; berry of medium size, sweet and of pleasant flavour.

RED CHERRY.—Ripe 2nd July; bunch long; berry above medium in size; quality fair.

RED DUTCH.—Ripe 3rd July; bunch long and well filled; berry small; flavour good.

NEW RED DUTCH.—Ripe 5th July; bunch very long; berry small and very acid.

KNIGHT'S EARLY RED.—Ripe 27th June; bunch of medium length; berry small to medium, sweet and pleasant.

FAY'S PROLIFIC.—Ripe 1st July; bunch short; berry of medium size and good quality.

NORTH STAR.—Ripe 28th July; bunch long; berry quite small and acid.

LONDON RED.—Ripe 4th July; bunch long; berry large, sweet and of good quality.

MOORE'S RUBY.—Ripe 1st July; bunch long; berry above medium in size and of pleasant flavour.

VICTORIA.—Ripe 8th July; bunch of medium length; berry large; quality fair.

LA CONDÉ.—Ripe 27th June; bunch long; berry very large, sweet and of pleasant flavour, very good.

LA HATIVE.—Ripe 26th June; bunch long; berry small, sweet and of pleasant flavour.

LA FERTILE.—Ripe 27th June; bunch of medium length; berry large and very even in size; sweet and of pleasant flavour, one of the best.

VERSAILLAISE.—Ripe 29th June; bunch of medium length; berry above medium in size and of good quality.

WHITE CURRANTS.

WHITE DUTCH.—Ripe 2nd July ; bunch long and full ; berry above medium size ; sweet and pleasant.

WHITE GRAPE.—Ripe 27th July ; bunch of medium length ; berry of medium size and very good quality.

WHITE TRANSPARENT.—Ripe 26th June ; bunch long and full ; berry large, sweet and pleasant.

WHITE GONDOIN.—Ripe 3rd July ; bunch short ; berry small ; but of fine flavour.

GOOSEBERRIES.

Nearly all of the varieties of gooseberries growing here fruited this season ; several sorts were free from mildew and all were much cleaner than last year, and it is hoped that with continued spraying we shall be able to raise this fine fruit without mildew.

QUEEN VICTORIA.—Ripe 18th July ; fruit large, green, nearly free from mildew, foliage healthy.

GOVERNESS.—Ripe 10th July ; foliage and fruit nearly free from mildew ; berries 1 to $1\frac{1}{8}$ inches long by $\frac{3}{4}$ to $\frac{7}{8}$ inch diameter ; green in colour when ripe ; sweet and of very pleasant flavour.

KING OF TRUMPS.—Ripe 16th July ; very little mildew on fruit, none on foliage ; fruit about same size as Governess ; greenish white when ripe, very rich in flavour.

WHITESMITH.—Ripe 12th July ; quite free from mildew ; fruit large, and very fine ; greenish white when ripe.

RED CHAMPAGNE.—Foliage clean ; berry considerably mildewed.

DUBLIN.—Foliage clean and healthy ; very little fruit ; berries mildewed.

HIGH SHERIFF.—Ripe 8th July ; Very little mildew on foliage ; berry very large 1 to $1\frac{3}{8}$ long $\frac{3}{4}$ to $\frac{7}{8}$ inches diameter ; slightly mildewed ; red and of pleasant flavour.

EARLY SULPHUR.—Ripe 1st July ; foliage slightly mildewed ; fruit nearly spoiled with mildew ; berry small, bright yellow and of very fine quality.

BOBBY.—Ripe 13th July ; foliage mildewed ; fruit small, red, and a large proportion of it mildewed.

BEAUTY.—Foliage healthy ; fruit spoiled with mildew.

BONNIE LASS.—Ripe 19th July ; foliage nearly clean ; fruit of medium size ; green colour and of fine quality.

IMPROVED EARLY HEDGEHOG.—Ripe 16th July ; foliage clean ; fruit nearly free from mildew ; berry medium to large ; greenish yellow ; very sweet and of fine flavour.

WHITE CHAMPAGNE.—Ripe 9th July ; foliage and fruit nearly free from mildew ; fruit of medium size ; yellowish white colour, quality good ; productive.

GREEN OVERALL.—Ripe 11th July ; foliage clean ; fruit considerably mildewed ; berry short and full $\frac{3}{4}$ in. by $\frac{3}{4}$; colour green ; flavour good.

LEVELLER.—Ripe 15th July ; foliage clean ; fruit nearly free from mildew ; berry large $1\frac{1}{4}$ by $\frac{7}{8}$ inches ; colour greenish yellow ; quality very good.

BLACKLEY HERO.—Ripe 13th July ; foliage nearly clean ; fruit slightly mildewed ; berry very large of a whitish green colour, and very fine quality.

PITMASTON GREEN GAGE.—Ripe 10th July ; foliage healthy ; fruit nearly free from mildew ; berry small to medium in size, colour green.

LANCASHIRE LAD.—A feeble grower ; foliage healthy ; fruit mildewed.

CROWN BOB.—Foliage healthy ; fruit mildewed.

WHENHAM'S INDUSTRY.—Ripe 9th July ; foliage nearly clean ; fruit almost free from mildew ; berry very large and of very fine quality.

EVA.—Ripe 12th July ; a feeble grower ; foliage and fruit healthy ; berry small and of poor flavour.

OREGON SEEDLING.—Ripe 24th July ; vigorous and productive ; no mildew fruit large ; colour greenish yellow ; flavour good.

HOUGHTON.—Vigorous and productive ; ripe July 26 ; no mildew ; fruit small ; colour pale red.

DOWNING—A vigorous grower, and very productive; ripe July 28; no mildew; berry of medium size; greenish yellow colour and good quality.

COLUMBUS—Ripe July 28; no mildew; fruit above medium size; greenish yellow colour and very fine quality.

Crown Bob, Queen Victoria, Industry and Whitesmith, planted on the bench, about 600 feet above those on the level, have never shown any trace of mildew on foliage or fruit, and the fruit ripened from six to ten days earlier than the same varieties below.

JUNE BERRIES.

DWARF JUNE BERRY—Bush 3 to 4½ feet high; ripe June 20th; fruited freely, but was attacked by a fungus when the fruit was nearly ripe; fruit mild and sweet, resembles the huckleberry.

TALL JUNE BERRY, (*Amelanchier canadensis*)—Height 8 to 12 feet; does not fruit as freely as the dwarf variety; ripe 20th July; not attacked by fungus; fruit small, sweet and insipid.

BLACKBERRIES.

All the varieties reported on last year, fruited again this season, and several new ones. The drought was so severe that the berries were much smaller than in previous years, and only the earlier portion of the crop matured. In some cases the berries dried up on the bushes. Of the old varieties, Taylor, Agawam, Snyder and Erie continue to prove most satisfactory.

In the following notes, reference is made to both the old and newer sorts:—

LOVETT'S BEST—Only a medium grower, canes productive; ripe 7th August; berry large and handsome, and of very fine quality.

EVERGREEN—Canes very vigorous and of trailing habit; tender, kills back at tips; productive; ripe 20th August; berry very uneven in size, ranging from large to very large; only fair in quality.

THOMPSON'S EARLY MAMMOTH—A very strong grower, but not productive; ripe August 4th; berry of medium size, and very even; firm, of good flavour, but acid.

CHILDS' TREE—Too tender even for this climate; kills back nearly to the ground.

DALLAS—A weak grower and tender; not productive; ripe 6th August; berry below medium size.

BRUNTON—A moderate grower; bore very little fruit; ripe 9th August; berry large and of good quality.

STONE'S HARDY—Vigorous and productive; ripe 4th August; berry large and of good quality.

SNYDER—A vigorous grower and productive; ripe 1st August; berry large and of good quality.

AGAWAM—A vigorous grower and very productive; ripe 4th August; berry, medium to large; sweet.

TAYLOR'S PROLIFIC—A vigorous grower and very productive; ripe 2nd August; berry large, firm and of fine quality.

MINNEWASKA—A feeble grower; not productive; ripe 6th August; berry small.

EARLY CLUSTER—Medium grower and productive; ripe 2nd August; berry large and good.

EARLY HARVEST—A moderate grower; productive; ripe 1st August; berry of medium size; quality good.

TECUMSEH—A feeble grower; not productive; ripe 10th August.

CRYSTAL WHITE—A slender grower and not productive; ripe 13th August; berry small, but of good quality.

KITTATINNY—A strong grower and productive; ripe 4th August; berry medium in size and of very good quality.

WILSON JR.—A straggling slender grower; not productive; ripe 5th August; berry small to medium in size.

WILSON'S EARLY—Very similar to Wilson Jr. in habit of growth and productiveness ; ripe 2nd August ; berry acid, with a hard core of medium size.

LAWTON—A very vigorous grower and productive ; ripe 8th August ; berry above medium size, but of poor quality.

ERIE—A stiff, erect grower and fairly productive ; ripe 4th August ; berry large and of very fine quality.

EARLY KING—A medium grower and fairly productive ; ripe 2nd August, berry very uneven in size, ranging from small to large ; sweet and of a pleasant flavour.

ELDORADO—Canes stout and healthy ; only a few berries produced ; ripe 13th August ; berry large, firm and handsome ; sweet and of a pleasant flavour.

OHMER—Canes stout and of medium length ; ripe 13th August ; produced a few berries of a large size and good quality.

MAXWELL—A strong grower and fairly productive ; ripe 4th July ; berry large and of good flavour.

LUCRETIA DEWBERRY—Ripe 29th July ; berry large and sweet.

RASPBERRIES.

The drought and hot weather reduced the crop of raspberries. In the early part of the season the berries were of medium size, but later they became much smaller, and the fruit of some of the late ripening varieties dried up on the canes. All those which fruited last year fruited again this season, ripening from eight to fourteen days earlier than last year.

Crimson Beauty fruited this year for the first time. Canes, fairly strong ; growth, productive ; ripe 1st July ; fruit large, round, bright crimson, firm and of very good quality.

ALL SUMMER.—Not a strong grower, but productive, very late in ripening, and continues producing fine berries after other varieties are gone ; first berries ripe 16th July ; berry large round, bright red, and of fine flavour.

NORTHUMBERLAND FILL-BASKET.—This variety fruited last year. The canes were strong, healthy growers ; ripe 28th June ; fruit very large ; dark red sweet and of fine flavour ; same shape as Cuthbert, but much larger, and as productive ; firm, and would ship well.

CARTER'S PROLIFIC.—Ripe 28th June ; large, and of good quality, but crumbles when picked.

FRANCONIA.—Ripe 2nd July ; not a strong grower, but productive ; berry large, handsome and sweet, but crumbles more or less when picked.

BAUMFORTH'S SEEDLING.—Ripe 28th June ; too small for profit.

BELLE DE FONTENAY.—A vigorous grower and productive ; ripe 27th July ; fruit very uneven in size, ranging from small to large, of good flavour, but quite acid.

LORD BEACONSFIELD.—Not a strong grower nor productive ; ripe 27th June ; berry large, conical, dark red acid and of poor quality.

THOMPSON.—Canes feeble and not productive ; ripe 28th June ; berry very small and of poor quality.

CUTHBERT.—Canes vigorous and productive ; ripe 26th June ; berry large, conical, bright red and of superior quality.

CHAMPLAIN.—Canes vigorous, healthy and productive ; ripe 2nd July ; berry large, bright yellow, sweet, and of very fine quality, but too soft for shipping.

WHITE ANTWERP.—A weak grower, but moderately productive ; ripe 25th June ; berry of fair size, good flavour, pale yellow colour, but is liable to crumble when picked.

CAROLINE.—A strong grower ; ripe 26th June ; berry small and of poor flavour.

GOLDEN QUEEN.—A very vigorous grower and moderately productive ; ripe 26th June ; berry large, bright yellow and of very good quality.

SHAFFER'S COLOSSAL.—Canes very vigorous and productive ; ripe 9th July ; berry, very large, round, dark purple, of good flavour, but rather acid.

BLACK CAP RASPBERRIES.

SOUHEGAN.—Plant vigorous and productive; ripe 8th July; berry large, but of poor quality.

MAMMOTH CLUSTER.—Plant very vigorous and moderately productive; ripe 11th July; berry large and of fair quality but soft.

GREGG.—Canes strong and productive; ripe 14th July; berry large and firm, very handsome and of very good quality.

ADA.—A feeble grower, and not productive; ripe 12th July; berry small but of good quality.

KANSAS BLACK.—Canes strong, vigorous and productive; ripe 30th July; berry large, of good quality, and a good shipper.

CROMWELL.—A strong vigorous grower, but kills back at the tips; ripe 2nd July; berry below medium in size, sweet and of pleasant flavour.

OLDER.—A vigorous grower, but almost tender, killing back at tips every winter; productive; ripe July 12th; berry large, sweet and of good flavour.

PROGRESS.—A vigorous grower, but tender and not very productive; ripe 11th July; berry too small for profitable cultivation.

LOVETT.—A fair grower, but not productive; ripe 5th July; berry very uneven in size, but of a fair quality.

SMITH'S PROLIFIC.—A feeble grower; ripe 6th July; berry of medium size, but poor in quality, seedy and lacks juiciness.

JACKSON'S MAY KING.—A medium grower, not productive; ripe 2nd July; berry small, seedy and lacks juiciness; rather acid.

PALMER.—A strong grower and productive; ripe 3rd July; berry large, handsome, sweet and juicy; one of the best.

EARLY OHIO.—Canes vigorous and productive; ripe 30th June; berry above medium size, firm, sweet and of pleasant flavour.

CARMAN.—Canes vigorous and very productive; ripe 9th July; berry of medium size, and good flavour but rather acid.

NEMAHA.—Canes vigorous and productive; ripe 10th July; berry of medium size, sweet and firm.

STRAWBERRIES.

The strawberry crop was a very good one this year, and during the early part of the picking season the weather was very favourable. The latter part of the season was less favourable, frequent rains and warm weather causing the berries to become soft and easily spoiled, which injured their shipping qualities. The following berries fruited for the first time.

PHILLIP'S SEEDLING.—Strong healthy grower and productive; ripe 11th June; berry large, firm, bright red, of good flavour.

OMEGA.—Plant vigorous, healthy and productive; ripe 12th June; berry of medium size, conical, bright red and fine flavour.

SMITH'S SEEDLING.—Plant healthy, vigorous, and moderately productive; ripe 13th June; berry firm and solid; above medium size, and holds its size to the end of the season, flavour good, a little acid, colour bright red.

IMPROVED JUCUNDA.—Plant a strong healthy grower and very productive; ripe June 14; berry long, bright red, of good quality, not firm enough to ship to distant markets, but valuable for those near by.

DAYTON.—Plant a vigorous grower, but foliage is subject to rust; not productive; ripe June 14th; berry of medium size, very light red colour, fair quality, but soft.

GREENVILLE.—Plant a moderate grower; not productive; ripe 13th June; berry very irregular in size, ranging from small to large, not firm.

MAXWELL.—Plant a strong vigorous grower, but the foliage is inclined to rust; productive; Berry above medium in size, very even and handsome, firm and solid, and of very fair quality.

BEVERLY.—Plant vigorous healthy and productive ; ripe 22nd June ; berry large, bright red, conical, and very even in size throughout the season and it continued in season for some days after all the other berries were gone.

The following is the order of ripening of the berries reported on last year :

Name.	Date.
Warfield.....	June 6.
Chairs.....	" 7.
Van Deman.....	" 7.
Beder Wood.....	" 7.
Windsor Chief.....	" 8.
Eclipse	" 8.
Yale.....	" 8.
Sir Joseph Paxton.....	" 8.
Dr. Hogg.....	" 9.
Empress Eugenie.....	" 9.
Alexander II.....	" 10.
Hautboise.....	" 10.
Alpha.....	" 11.
Parker Earle.....	" 12.
Daisy	" 12.
Bonnie Lass.....	" 12.
Iowa Beauty.....	" 13.
Pine Apple.....	" 13.
Laxford Hall.....	" 18.

Of these Warfield and Iowa Beauty have proved to be the most productive, and most desirable berries in that list. The plants are strong healthy growers ; productive; and the fruit is even in size, handsome, firm and of very fine quality.

VEGETABLES.

GARDEN PEASE.

Sixteen varieties of garden pease were tested. Bliss's Abundance is the best early pea tried this year. Heroine and Shropshire Hero for medium, and Stratagem with Duke of Albany for late, furnishes a very good selection for the whole season.

Name of Variety.	Sown.	Up.	Fit for table.	Remarks.
Prince of Wales.....	April 29..	May 8..	July 15..	Vine medium ; pods long and well filled ; pease large and of very fine flavour.
Duke of Albany.....	do 29..	do 8..	do 29..	Vine 4½ to 5 ft. ; pods medium in length and filled to tip ; pease above medium size and of best quality for table.
Horsford's Market Garden..	do 29..	do 8..	do 26..	Vines of medium length and very produc- tive ; pods long and well filled ; pease large and of fine quality.
Burpee's Profusion.....	do 29..	do 8..	do 16..	Vines of medium length and very produc- tive ; pods of medium length and well filled ; pea large and of good quality.
Daniel's Matchless Marrow..	do 29..	do 8..	do 15..	Vines long, 2 to 2½ ft. and productive ; pods 3½ to 4 in. long, well filled ; pease large and of fair quality.
Heroine.....	do 29..	do 8..	do 16..	Vine of medium length and fairly produc- tive ; pods 2½ to 3 in. long, well filled ; pease large and of good flavour.

GARDEN PEASE—*Concluded.*

Name of Variety.	Sown.	Up.	Fit for table.	Remarks.
Juno.....	April 30..	May 10..	July 13..	Vines medium in length and productive ; pods long and filled to the end with large pease of the first quality.
C. P. R.....	do 30..	do 13..	do 28..	Vines 2 to 2½ ft. long, productive ; pods from 1½ to 3 in. long and well filled ; pea large, quality fair.
Telegraph.....	do 30..	do 13..	do 15..	Vines 2½ to 3 ft. long, productive ; pods 2 to 3 in. long, well filled ; pea large and of good quality.
Little Giant.....	do 30..	do 10..	do 10..	Vines 10 to 15 in. long, very productive ; pods well filled ; pea of medium size, quality good.
Harris Dwarf Mammoth.....	do 30..	do 10..	do 27..	Vine 12 in. moderately productive ; pod 1½ to 2½ in. long, quality very good.
Stratagem.....	do 30..	do 13..	do 30..	Vine 1½ to 2 ft. long, productive ; pods 2 to 3 in. long ; pease of medium size and very good quality.
Maud S.....	do 30..	do 10..	do 10..	Vine 2 ft. long and fairly productive ; pods 1½ to 2 in. long ; pease small, quality fair.
Shropshire Hero.....	do 30..	do 10..	do 20..	Vines 2 to 2½ ft. long and very productive ; pods 2½ to 3 in. long and well filled ; pease large and of very good quality.
Sunol.....	April 29..	do 10..	do 10..	Vines of medium length, 1½ to 2 ft., not productive ; pods well filled with large pease of good quality.
Bliss' Abundance.....	do 29..	do 10..	do 10..	Vines 1 to 1½ ft. long, productive ; pods short but well filled ; pease large and of very fine quality.

BEANS.

Four varieties of beans were sown in drills 18 inches apart. All were very fine in quality. The Mammoth German wax was the most productive.

Name of Variety.	Planted.	Up.	Fit for use	Remarks.
Emperor William.....	April 30..	May 18..	July 20..	Crisp and fine ; very productive.
Mam. German Wax.....	do 30..	do 17..	do 26..	Vines vigorous and productive ; pods long ; crisp, good flavour ; one of the best.
Dwarf Triumph.....	do 30..	do 17..	do 28..	Vines medium ; productive ; pods fair length ; crisp and pleasant.
Speckled Wax.....	do 30..	do 17..	do 14..	Productive ; pods crisp, and of very good quality.

TABLE CORN.

Champion Sweet.....	May 16..	June 4..	Aug. 20..	Ears 5 to 7 inches long and well filled to tip ; grains large, sweet and of very fine quality.
Minnesota.....	do 16..	do 3..	do 8..	Ears 3 to 5 inches long, slender ; medium quality.
Perry's Hybrid.....	do 16..	do 6..	do 10..	Ears 5 to 6 inches long, well filled out and of good quality.
Ford's Early Sugar.....	do 16..	do 3..	do 14..	Ears 4 to 6 inches long and well filled ; very sweet and remains fit for use nearly 4 weeks.
Marblehead.....	do 16..	do 5..	do 6..	Ears 3 to 5 inches long and well filled ; quality good.
Mitchell's Extra Early.....	do 16..	do 2..	do 2..	Ears 3 to 5 inches long ; quality inferior and becomes hard very soon after it is fit for use.

TABLE TURNIP.

Breadstone.—Medium size, smooth, white and of very good quality ; crisp, cooks without stringiness ; sown April 29th, fit for table August 12th ; a medium cropper ; better for table use than Swedes.

TABLE CARROTS.

Seven varieties of this vegetable were tested. Early Gem is one of the best ; a good cropper, keeps well and is very sweet and of pleasant flavour.

Seven varieties of table carrots were sown in drills, fifteen inches apart, and the following notes taken as to growth, quality, etc. :

Name of Variety.	Sown.	Fit for Use.	Description.
Mitchell's Half Long.....	April 27..	July 6...	Red, pointed roots ; slender and not of first quality.
Pearce's Scarlet Intermediate	do 27..	do 10...	Red, half-long ; medium size ; a good cropper ; quality good.
Henderson's Intermediate....	do 27..	do 3...	Pointed roots, stout ; a good cropper ; quality fair.
St. Valery.....	do 27..	do 20...	Long rooted ; not a good cropper ; quality poor.
Early English Horn.....	do 27..	June 20...	Short stump-rooted ; of very good quality.
Danver's Half Long.....	do 27..	July 18...	Pointed roots ; a good cropper, and of good quality.
Early Gem.....	do 27..	do 6...	Stump rooted ; a heavy cropper, and of very fine quality.

TABLE BEETS.

Five varieties were sown in drills, fifteen inches apart, and thinned to six inches in the row.

Name of Variety.	Sown.	Up.	Fit for Table.	Remarks.
Rennie's Intermediate.....	April 29..	May 17..	Aug. 10..	Very dark red ; very fine quality ; medium length ; smooth ; a good cropper.
Imperial Early Blood Turnip.	do 29..	do 17..	July 16..	Turnip rooted. Very dark red ; smooth ; of good quality.
Evans' Medium.....	do 29..	do 19..	Aug. 15..	Pointed rooted, smooth ; a fair cropper, but not a dark colour.
Ne Plus Ultra.....	do 29..	do 17..	do 20..	Pointed rooted, long, very dark red ; fine quality.
Whyte's Extra Dark Red....	do 29..	do 19..	do 15..	Long pointed roots ; medium size ; very fine colour ; good flavour ; not a heavy cropper.

PARSNIPS.

The following varieties of parsnips were sown in drills 18 inches apart :—

Name.	Sown.	Up.	Fit for table.	Remarks.
Maltese.....	April 26..	May 17..	Sept. 25..	From 10 to 12 in. long, large and fairly smooth ; very fine for table.
Half-long Guernsey.....	do 26..	do 19..	do 10..	Roots 6 to 10 in. long, 1 to 3 in. at crown ; smooth and very sweet.
Student.....	do 26..	do 19..	do 1..	Roots short, 5 to 9 in. long ; not a heavy cropper, quality fair.

RADISH.

Seven varieties of Radish were tested, all were sown in open ground, in rows 6 inches apart.

Name.	Sown.	Fit for use.	Shape.	Colour.	Remarks.
Early Forcing.....	April 27..	June 1..	Turnip.	Pink.....	Very small, and soon becomes spongy.
Scarlet Butter.....	do 27..	do 1..	do	Scarlet.	Very sweet and crisp.
Brightest Long Scarlet.	do 27..	do 15..	Long.	do	Very good ; crisp, sweet and pleasant.
White Tipped.....	do 27..	do 6..	Turnip.	White root..	Crisp, sweet and pleasant.
Golden Turnip.....	do 27..	do 10..	do	Yellow.	Not crisp ; stringy, and soon becomes spongy.
Ne Plus Ultra.....	do 27..	July 2..	Round.....	Scarlet.	Crisp and pleasant.
China Rose.....	Aug. 13..	Nov.	Oblong.....	Rose.	Winter : large, crisp, mild and sweet.

CABBAGE.

Twelve varieties of cabbage were tested. The Vandergaw made the largest per cent of fine solid heads, but when the rains came in the last of August they burst open and spoiled. The Flat Dutch headed well and none of the heads burst. It is one of the best late varieties we have tested for this district.

Name of Variety.	Sown.	Trans-planted.	Headed and Fit for Use.	Remarks.
Henderson's Early Summer..	April 25..	May 25..	July 25..	Heads small, but solid, crisp and very fine.
Express	do 25..	do 25..	Aug. 1..	Heads small and poor.
Savoy	do 25..	do 25..	Sept. 1..	Heads large and solid.
Vandergaw.....	do 25..	do 25..	do 1..	Heads large and very solid, but bursting open.
Dwarf York.....	do 25..	do 25..	July 6..	Heads small and soft.
Early Winningstadt.....	do 25..	June 4..	.....	Did not head.
Fielderkraut	do 24..	do 10..	.....	Heads too small and soft to be of value.
Henderson's Succession.....	do 24..	do 13..	.....	Heads very small and poor.
Dark Red Erfurt.....	do 24..	do 6..	Sept. 2..	Heads medium and very solid ; dark red.
Early Etampes.....	do 24..	do 2..	Aug. 22..	Heads small medium, very solid and fine flavour.
Stanley	do 24..	do 6..	do 18..	Heads medium size and fairly solid.
Flat Dutch.....	do 24..	do 6..	Sept. 7..	Heads large and very solid.

CAULIFLOWER.

Eight varieties of cauliflower were sown in hot-bed, April 24th, and transplanted as soon as they were fit. The hot dry summer prevented the late varieties from making large, perfect heads.

Name of Variety.	Sown.	Trans- planted.	Fit for Use.	Per cent. of Heads.	Remarks.
Extra Early Paris.....	April 24..	May 20..	Aug. 10..	50	Heads medium size, firm and good quality.
Large Early Dwarf Erfurt...	do 24..	do 23..	July 20..	70	Heads very uneven in size; quality very good.
Henderson's Early Snowball.	do 24..	do 23..	do 18..	90	Heads large and of very fine quality.
Snowstorm	do 24..	do 23..	do 18..	90	Heads large but loose and imperfect.
Bruce's Selected.....	do 24..	do 23..	do 25..	80	Heads open and soft.
Walcheren.. ..	do 24..	do 23..	Aug. 24..	30	Heads small and badly formed.
Demi Dur.....	do 24..	do 23..	do 19..	20	Heads large and very fine, but only a few plants produced heads.

ONIONS.

Onions of the following varieties were sown in drills 15 inches apart, on sandy loam. The dry, hot weather set in before they had much growth and the crop was almost a failure. The Yellow Danvers (Globe) and Red Wethersfield were the two best varieties tested this year.

Name of Variety.	Sown.	Up.	Fit for Use.	Remarks.
Red Globe Danvers.....	April 25..	May 10..	Aug. 20..	Red globe; did not grow well; mild and pleasant.
Large Yellow Globe Danvers.	do 25..	do 10..	do 20..	Medium size; yellow globe; ripened well.
Yellow Flat Danvers.....	do 25..	do 10..	do 24..	Small, flat; a poor cropper, with a strong flavour.
Southport Red Globe.....	do 25..	do 10..	do 28..	Red globe; a medium cropper; fair size; ripened well; strong flavour.
Southport Yellow Globe	do 25..	do 10..	do 28..	Yellow globe; a poor cropper; mild flavour.
Red Wethersfield.....	do 25..	do 10..	do 25..	Red flat; a good cropper and ripens well; has a very strong flavour.
Giant Yellow Spanish.....	do 25..	do 10..	Sept. 1..	Yellow; did not bottom; very large, coarse tops; mild flavour.
Silver Skin.....	do 25..	do 10..	Aug. 10..	Small; white; for pickling.

TOMATOES.

Seven varieties of tomatoes were sown in hot-bed and transplanted to warm, sandy loam as soon as the plants were large enough. Owing to the hot, dry weather the tomatoes have done better than in any previous year. Early Mayflower and Canada Victor were the best varieties tested.

Name of Variety.	Sown.	Trans-planted.	Ripened.	Description.
Early Mayflower.....	April 24..	June 4..	Sept. 3..	Medium size, smooth and solid; ripens evenly; good.
Canada Victor.....	do 24..	do 4..	do 6..	Large; strong grower; productive; solid and of good quality.
Acme	do 24..	do 4..	do 8..	Not a strong grower; not productive; fruit small, medium size; very seedy.
Vaughan's Earliest of All..	do 24..	do 4..	do 18..	This rotted before ripening; only a few perfect tomatoes were obtained.
Mitchell's No. 1.....	do 24..	do 4..	do 18..	A strong grower; fruit very irregular in shape and size; solid and of fair quality.
Ponderosa.....	do 24..	do 4..	do 20..	A strong, vigorous grower and productive; fruit large; rotted badly before quite ripe.
Strawberry.....	do 24..	do 13..	do 21..	Vines productive; fruit small, yellow, for preserving.

SQUASH AND PUMPKINS.

Name of Variety.	Planted.	Fit for use	Remarks.
Boston Marrow.....	April 26..	Sept. 6 ..	Vines vigorous and productive; marrows large and of very fine quality.
Vaughan's Summer Crook-neck	do 26..	Aug. 16..	Vines very productive; squash very watery.
White Bush Scallop.....	do 26..	do 18..	Vines productive; squash large for the variety, but watery and lacking flavour.
Mammoth Squash.. ..	do 26..	Oct. 21..	Vines very vigorous and productive; many of the squash weighing over 60 pounds each.
Quaker Pie Pumpkin	do 26..	Sept. 20..	Pumpkin small; vine not productive, quality, fair.
Calhoun Pumpkin	do 26..	do 8..	Vine not productive; pumpkin medium size, quality poor.
Small Sugar Pumpkin	do 26..	Aug. 28..	Vines very productive: pumpkin small, very thick-fleshed and of good quality.

ASPARAGUS.

The asparagus plants received and planted in the spring of 1894 were covered with a mulch of manure in the fall, which was forked into the ground last spring. The growth has been very vigorous this year and will no doubt produce a fine crop next spring.

Seeds of the following varieties were received and sown last spring, Donald's Elmira, Giant and Palmetto, all have made a fine growth and will be transplanted next season.

PARSLEY.

A packet of Taber's exquisite curled parsley was sown April 27th and was fit for use in July. This is a very fine flavoured variety and a vigorous grower.

CELERY.

Eight varieties of Celery were tested, with the following results. The White Plume was the best, being of excellent quality and a vigorous grower :—

Name of Variety.	Seed Sown	Trans- planted.	Remarks.
Paris Yellow	April 26..	July 5..	A moderate grower; stalks stout, firm and of good quality.
Giant Turkish Purple	do 26..	do 5..	A feeble grower; quality poor.
White Plume	do 26..	do 5..	Stalks stout and solid; a very compact grower; quality good.
Perfection Heartwell	do 26..	do 5..	A vigorous grower; stalks firm and of very good quality.
White Solid	do 26..	do 5..	Only a medium grower, but stalks white, solid and of very fine quality.
Dwarf Crimson	do 26..	do 5..	Very dwarf; stalks short and slender; quality poor.
Simmers Ribbed Dwarf White	do 26..	do 5..	Not a strong grower; quality poor.
New Rose	do 26..	do 5..	Stalks short and slender; quality poor.

LETTUCE.

Seven varieties of lettuce were tested with results as follows :—

Name of Variety.	Sown.	Fit for use	Remarks.
Early Obii	April 27..	June 2..	Not crisp or sweet.
Imperial	do 27..	do 10..	Loose and open; quality fair.
All Heart	do 27..	do 10..	Heads fairly compact; quality good.
Big Boston	do 27..	do 14..	Coarse; quality poor.
Nonpareil Cabbage	do 27..	do 14..	Heads large, firm and crisp.
Defiance	do 27..	do 16..	Not good; heads soft and leathery.
Silesia	do 27..	do 18..	Heads small, compact and firm; quality good.

MELONS (MUSK).

Four varieties of melons were tested, viz.: Christiana, Hackensack, Osage and Southern Beauty. The melons grew to about half size only on all these varieties and none of them ripened.

CUCUMBERS.

The following eight varieties were tested with results as stated :—

Name of Variety.	Planted.	Up.	Remarks.
Long Green	April 26..	May 20..	Fit for table Aug. 15th, long and crisp, quality good.
Talby's Hybrid	do 26..	do 20..	Fit for use Aug. 20th, vines not productive, medium size, quality fair.
Improved Long Green	do 26..	do 21..	Fit for table Aug. 1st, a vigorous grower and productive, large, crisp and of pleasant flavour.
Lord Kenyon's Favourite	do 26..	.....	Seed did not germinate.
Livingston's Favourite	do 26..	do 20..	Fit for use Aug. 7th, not productive, quality good.
Noah's Forcing	do 26..	do 20..	Not productive, large but inferior in quality tough and leathery.
Rollinson's Telegraph	do 26..	do 20..	Only a few seeds germinated, a feeble grower, small and of poor quality.
Improved White Spine	do 26..	do 21..	Vines very productive, fit for table Aug. 27th, cucumber above medium in size and very crisp and good.

TOBACCO.

A packet of seed of Havana tobacco was received for test from the Commissioner of Dominion Lands, Winnipeg, Man., April 16th. This was sown at once as directed, and transplanted as soon as the plants had grown to sufficient size. They made a vigorous growth and when matured were cut and are being cured in accordance with the instructions accompanying seed.

METEOROLOGICAL RECORD.

1894-95.	Highest Tempera- ture.	Lowest Tempera- ture.	Total Rainfall.	Depth of Snowfall.	Total amount of sunshine.	
			Inches.	Inches.	Hrs.	Min.
December 16th to 31st, 1894.....	21st 41°	28th 23°	1·11	1½	51	27
January, 1895.....	12th 49°	7th 15°	4·90	25½	61	12
February	22nd 60°	23th 30°	7·72	None.....	69	54
March... ..	7th 66°	25th 27°	3·42	2¾	100	30
April.....	22nd 76°	25th 31°	3·03	None.....	128	06
May.....	16th 87°	5th 30°	6·39	do	136	54
June.....	28th 92°	6th 39°	2·45	do	175	18
July.....	9th 95°	3rd 40°	·97	do	221	36
August.....	29th 96°	14th 38°	·70	do	178	42
September...	30th 77°	21st 34°	6·67	do	81	36
October.....	18th 77°	29th 32°	·77	do	165	24
November.....	15th 61°	4th 29°	5·85	do	56	42
Total for 11½ months.....	.....	.....	43·98	29¾	1424	81
do 11½ months, 1894.....	.....	.....	67·23	86	1249	49

I have the honour to be, sir,
Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS, FOR THE YEAR ENDING 30TH JUNE, 1895.

CENTRAL EXPERIMENTAL FARM—EXPENDITURE, 1894-95.

Live stock.....	\$ 704 15
Feed for stock, including veterinary services.....	1,544 72
Seed grain, seeds, trees, &c.....	991 43
Implements, tools, hardware and supplies.....	1,147 72
Draining and drain tiles.....	275 50
Manure and fertilizers.....	965 56
Travelling expenses.....	1,136 65
Exhibition expenses.....	799 57
Blacksmithing, harness supplies and repairs.....	391 82
Bee supplies.....	28 15
Salaries.....	1,768 24
Wages, farm work, including experimental work with grain and other farm crops; also, salaries of farm foreman and director's assistant in experimental work.....	5,325 66
Wages, care of stock.....	2,338 45
Chemical department.....	766 19
Botanical and Entomological Department.....	900 20
Horticultural department.....	4,239 86
Poultry department.....	1,439 39
Forestry department and care of grounds.....	2,062 96
Arboretum.....	504 43
Office help, correspondence branch and messenger service.....	2,505 91
Printing and stationery.....	971 40
Seed testing and care of greenhouses.....	793 07
Dairy department.....	879 43
Contingencies, including meteorological observations, \$72.....	226 39
Contingencies, books and newspapers.....	119 19
do telegrams and telephones.....	91 87
Farm gates, lumber supplies, painting buildings, building tool house, &c.....	1,287 97
	<hr/>
	\$ 34,205 88

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1894-95.

Live stock.....	6 15
Feed for stock, including veterinary services.....	170 47
Seed grain, seeds, trees, &c.....	131 28
Implements, tools, hardware and supplies.....	216 77
Draining and drain tiles.....	337 34
Manure and fertilizers.....	251 69
Travelling expenses.....	194 00
Exhibition expenses.....	258 34
Blacksmithing, harness supplies and repairs.....	69 90

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1894-95—*Con.*

Salaries, including proportion of salaries for general work, Ottawa.....	\$	2,431	48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c.....		1,469	54
Wages, care of stock.....		829	37
Chemical department.....		446	94
Botanical and Entomological department.....		345	97
Forestry department.....		143	93
Poultry department.....		9	00
Office help.....		40	00
Seed grain distribution.....		123	00
Contingencies, (including postage, \$40.85).....		220	74
do printing and stationery.....		5	78
do books and newspapers.....		6	00
do telegrams.....		1	94
	\$	7,709	63

EXPERIMENTAL FARM, BRANDON, MANITOBA.—EXPENDITURE 1894-95.

Live stock.....	\$	6	65
Feed for stock, including veterinary services.....		102	46
Seed grain, seeds, trees, etc.....		122	27
Implements, tools, hardware and supplies.....		552	36
Draining and drain tiles.....		427	82
Travelling expenses.....		190	60
Exhibition expenses.....		63	03
Blacksmithing, harness, supplies and repairs.....		355	64
Salaries, including proportion of salaries for general work, Ottawa.....		2,431	48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, etc.....		2,671	81
Wages, care of stock.....		586	24
Chemical department.....		446	94
Botanical and Entomological department.....		345	97
Forestry.....		501	32
Poultry Department.....		10	70
Office help (including delivery of mail, \$147.00).....		282	00
Seed-grain distribution.....		365	55
Tree distribution.....		236	48
Contingencies, (including lumber supplies, repairs and fencing \$320.73, postage \$50.25, water-supply pipes \$39.26, supplies for piggery \$98.20).....		754	03
do printing and stationery.....		32	78
do books and newspapers.....		24	75
do telegrams and telephones.....		43	38
do legal services re purchase of land.....		15	26
	\$	10,569	52

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—EXPENDITURE 1894-95.

Live stock.....	\$	28	33
Feed for stock, including veterinary services.....		721	78
Seed-grain, seeds, trees, etc.....		136	41

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T., EXPENDITURE, 1894-95—*Con.*

Implements, tools, hardware and supplies.....\$	388 88
Manure and fertilizers.....	223 05
Travelling expenses.....	324 25
Exhibition expenses.....	138 98
Blacksmithing, harness supplies and repairs.....	229 36
Salaries, including proportion of salaries for general work, Ottawa.....	2,431 48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, etc.....	2,557 26
do care of stock.....	1,089 45
Chemical department.....	446 94
Botanical and Entomological department.....	345 97
Poultry department.....	63 54
Forestry department.....	465 33
Office help.....	429 00
Seed-grain distribution.....	342 92
Tree distribution.....	117 61
Contingencies (including postage \$108.99, water supply \$79.80).....	310 68
do printing and stationery.....	57 67
do books and newspapers.....	22 50
do telegrams.....	7 35
	<hr/>
	\$ 10,878 74

EXPERIMENTAL FARM, AGASSIZ, BRITISH COLUMBIA.—EXPENDITURE, 1894-95.

Live stock.....\$	50 24
Feed for stock, including veterinary services.....	329 09
Seed grain, seeds, trees, etc.....	133 08
Implements, tools, hardware and supplies.....	300 52
Draining and drain tiles.....	4 00
Manure and fertilizers.....	59 54
Travelling expenses.....	215 40
Exhibition expenses.....	134 66
Blacksmithing, harness supplies and repairs.....	89 85
Salaries, including proportion of salaries for general work, Ottawa.....	2,431 48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, etc.....	2,824 97
Wages, care of stock.....	271 25
Chemical department.....	446 94
Botanical and Entomological department.....	345 97
Poultry department.....	1 40
Forestry department.....	101 55
Office help.....	110 00
Seed grain distribution.....	74 42
Tree distribution.....	8 50
Clearing land.....	722 75
Contingencies (including postage \$69.32).....	164 17
do printing and stationery.....	19 76
do books and newspapers.....	23 50
	<hr/>
	\$8,863 04

SUMMARY.

Central Experimental Farm.....	\$	34,205	88
Nappan do		7,709	63
Brandon do		10,569	52
Indian Head do		10,878	74
Agassiz do		8,863	04
Printing bulletins and distribution of bulletins and reports.....	\$	1,199	33
Seed grain distribution.....		3,358	19
Forest tree and tree seed distribution....		215	67
		<hr/>	
	\$	4,773	19
Less special sum in estimates for these items.		2,000	00
		<hr/>	
		\$2,773	19
			2,773 19
			<hr/>
	\$	75,000	00

Purchase of additional land at Brandon as provided for in estimates \$1,000.00.

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, ETC., ON HAND
DECEMBER 31, 1895.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

16 Horses.....	\$	1,270	00
4 Ayrshire cattle		270	00
2 Devon "		90	00
3 Holstein "		180	00
7 Jersey "		395	00
21 Canadian "		590	00
34 Grade "		958	00
6 Yorkshire swine.....		160	00
6 Berkshire "		155	00
1 Essex "		25	00
3 Tamworth "		95	00
25 Grade "		105	00
Farm machinery.....		1,805	00
Farm implements		540	00
Vehicles, including farm wagons and sleighs		1,005	00
Hand tools, hardware and sundries.....		720	25
Harness		361	00
Dairy department, machinery, etc.....		811	00
Horticultural department, implements, tools, etc.....		163	25
Forestry department, implements, tools, etc.....		374	00
Botanical department, implements, tools, etc.....		8	00
Poultry department, 314 fowls.....		438	50
Poultry department, implements, furnishings, etc....		106	00
Bees and apiarian supplies.....		244	30
Chemical department, apparatus and chemicals.....		2,012	33
Books in the several departments.....		188	84
Greenhouse plants, supplies, etc.....		732	55
Office furniture and stationery		1,257	50
Furniture at Director's house.....		1,500	00
		<hr/>	
		\$16,560	52

EXPERIMENTAL FARM, NAPPAN, N. S.

7	Horses	\$	535 00
3	Durham cattle.....		170 00
10	Holstein "		453 00
3	Ayrshire "		160 00
36	Grade "		829 50
2	Yorkshire swine		35 00
3	Berkshire "		52 00
2	Tamworth "		27 50
33	Fowls		16 00
13	Vehicles, including farm wagons and sleighs.....		487 00
	Farm machinery		724 90
	“ implements.....		168 20
	Hand tools, hardware and sundries.....		344 88
	Harness.....		153 85
	Furniture for office, reception room, and bed room for visiting officials.....		328 55
			<hr/>
			\$ 4,485 38
			<hr/>

EXPERIMENTAL FARM—BRANDON, MANITOBA.

10	Horses	\$	850 00
2	Ayrshire cattle.....		175 00
2	Durham "		175 00
4	Holstein "		320 00
5	Grade "		75 00
1	Polled Angus.....		100 00
2	Tamworth swine		38 00
2	Yorkshire "		41 00
2	Berkshire "		46 00
145	Fowls.....		113 80
	Vehicles including farm wagons and sleighs.....		585 00
	Farm machinery		1,058 00
	“ implements.....		565 00
	Hand tools, hardware and sundries.....		706 46
	Harness		243 50
	Furniture for reception room and bedroom for visit- ing officials.....		224 80
	Furniture, supplies and books for office.....		219 55
			<hr/>
			\$ 5,536 11
			<hr/>

EXPERIMENTAL FARM—INDIAN HEAD, N. W. T.

11	Horses.....	\$ 1,540 00
6	Durham cattle	405 00
1	Polled Angus cattle	50 00
11	Holstein "	530 00
14	Grade "	355 00
13	Yorkshire swine.....	100 00
9	Berkshire "	85 00
5	Tamworth "	75 00
	Fowls.....	76 00
	Vehicles, including farm wagons and sleighs.....	598 00
	Farm machinery.....	1,163 00
	" implements	691 00
	Hand tools, hardware and sundries.....	577 67
	Harness.....	250 00
	Furniture for reception room and bedroom for visit- ing officials.....	309 75
	Furniture supplies and books for office.....	213 00
		<hr/>
		\$ 7,018 42
		<hr/>

EXPERIMENTAL FARM—AGASSIZ, B.C.

6	Horses	\$ 1,050 00
3	Durham cattle.....	300 00
5	Ayrshire "	330 00
3	Holstein "	300 00
1	Grade "	30 00
6	Dorset horned sheep.....	180 00
3	Berkshire swine.....	125 00
1	Yorkshire "	20 00
2	Tamworth "	90 00
29	Fowls	29 00
	Vehicles, including farm wagons.....	275 00
	Farm machinery.....	676 00
	" implements	149 00
	Hand tools, hardware and sundries.....	97 30
	Harness	87 00
	Furniture for reception room and bedroom for visiting officials	286 00
	Furniture, supplies and books for office.....	119 75
		<hr/>
		\$ 4,144 05
		<hr/>

W. H. HAY,
Accountant.

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